WILLIAM B WHERRY
BACTERIOLOGIST

MARINE BIOLOGICAL LABORATORY.

Received Sept. 12, 1939

Accession No. 51578

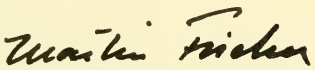
Given by Dr. H. McE. Knower

Place, Woods Hole, Mass.

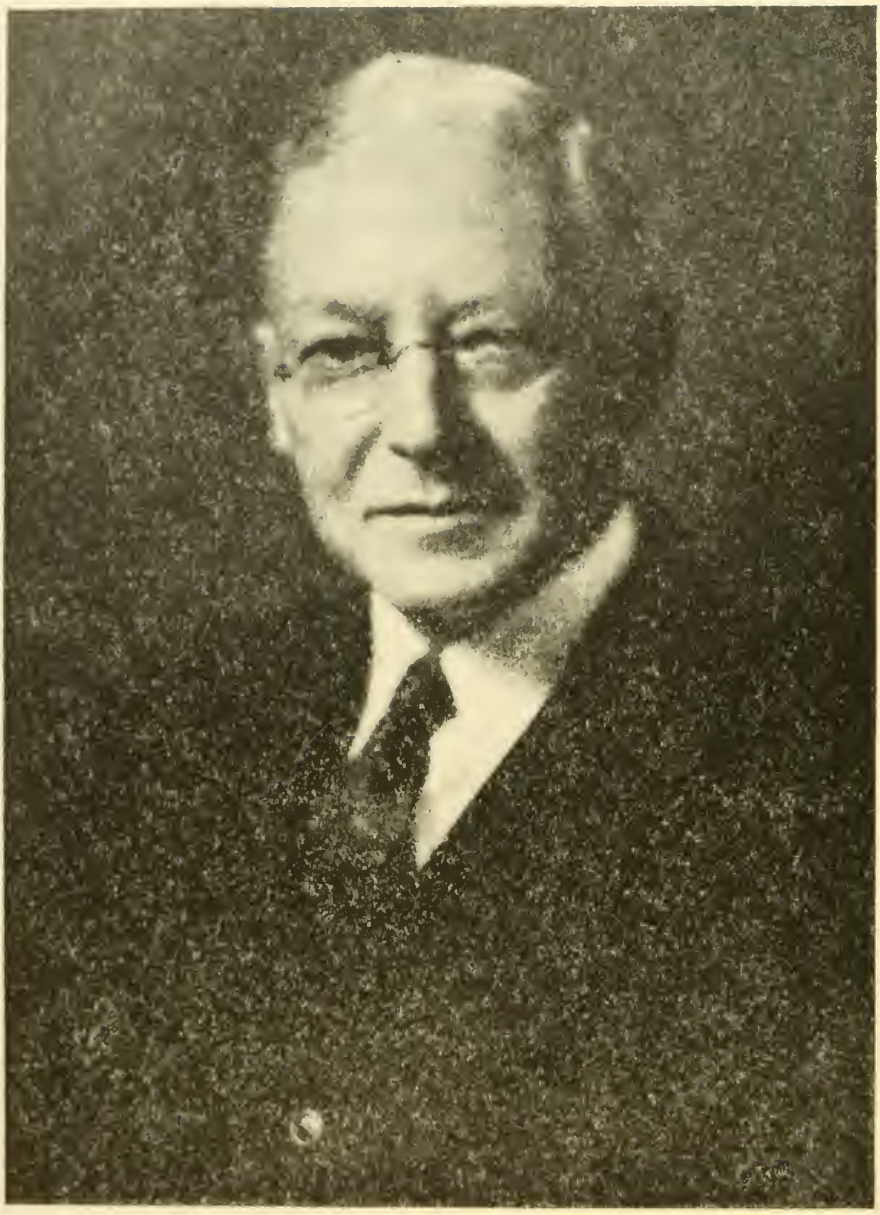
**No book or pamphlet is to be removed from the Laboratory without the permission of the Trustees.

MBL/WHOI
0 0301 0021061 3

This is number ~~138~~ *of*
five hundred specially
printed copies of
WILLIAM B WHERRY
BACTERIOLOGIST
by
MARTIN FISCHER
who, in evidence,
signs his name



Men write their own biographies . . .



Wm B. Wherry

QR 31
F67

WILLIAM B WHERRY
Bacteriologist

by

MARTIN FISCHER

CHARLES C THOMAS
SPRINGFIELD · ILLINOIS BALTIMORE · MARYLAND
1938

COPYRIGHT NINETEEN HUNDRED AND THIRTY-EIGHT BY MARTIN FISCHER
All rights reserved including the right to reproduce this book or parts thereof in any form

THE SCIENCE PRESS PRINTING COMPANY, LANCASTER, PENNSYLVANIA, U S A

WILLIAM B WHERRY

Bacteriologist

PREFACE

WHEN William Buchanan Wherry died, a colleague declared that "the last and the greatest of the bacteriologists of our period" had gone. Those who share this opinion find the evidence in his scientific papers. But Wherry had a hold upon the men of his circle (those of Cincinnati, especially) not explained by the listing of his publications. The fact has called forth this Nachruf. *Seven hundred stood at his funeral. They were not his relatives alone, but those who made his city, his university, his hospital, his health board; and a bereft conglomerate which could not otherwise declare affection. It is for these that the incidents of the following pages have been gathered together.*

MARTIN FISCHER

MARINE BIOLOGICAL
WOODS HOLE
LIBRARY
MASS.

University of Cincinnati, 1938
In the Joseph Eichberg Laboratory for Physiology

He died here Sunday,
unknown to the
general public. But
that is as he wanted it.
His scientific work
was for use, not
for the spotlight. (*Cincinnati* Post *editorial*)

CONTENTS

I 1874–1897
II 1897–1902
III 1902–1905
IV 1905–1906
V 1906–1907
VI 1907–1909
VII 1909–1912
VIII 1912–1915
IX 1915–1917
X 1917–1920
XI 1920–1925
XII 1925–1930
XIII 1930–1936
Bibliography

51578

BIRTHPLACE, LUDHIANA.
THE MISSION HOUSE OF THE
REVEREND ELWOOD MORRIS WHERRY

MARINE BIOLOGICAL WOODS HOLE LIBRARY MASS.

I

THE frail body of Clara Maria Buchanan went into labor for the fourth time in her life on the twenty-third of December in 1874. Of previous issues the son had died, leaving two daughters. This time it was again a son; and one destined to live—William Buchanan Wherry. For six years now she had been living in the missionary compound maintained in Ludhiana of the Panjab by the Presbyterian board of missions, as the wife of Elwood Morris Wherry, who at twenty-four, had pledged himself to this work of the Lord. The density of population here was great, the density of Christianity, low. The vineyard—so barren—needed working; and Wherry had volunteered. Thus the two, both out of Pennsylvania and of sound farmer stock had set forth in 1867 on the five months long sail into India.

Before venturing afar the missionary had equipped himself well. Born in 1843 (in South Bend, Indiana county, Pennsylvania), he was of sturdy frame, virile—as proclaimed by a flowing beard—and spiritually sure. What he possessed mentally, was clearly evidenced by a bachelor's degree wrested from Jefferson college (Presbyterian) in Washington, Pennsylvania, when but nineteen. Thereafter he had taught school for two years in the alma mater. With another three added for sojourn in Princeton's theological seminary (Presbyterian), he felt himself ready for any place to which God might call. This proved to be Ludhiana where at the moment under discussion he was thirty-one.

The confusion surrounding the new son's arrival was considerable. The Christmas holidays were on, even though the right merry Christmas of the British could be extended to but few—the members of the Wherry household, some stray servants of Her Royal Highness's Kingdom at large in the domains beyond the sea, and such East Indians as had forsworn their own mysticism for that out of Palestine. But more than

 this must have been active seriously to upset the compound, for his birthday, correctly noted above, was to go through his life of sixty-odd years as of December 24, 1875! Nor was he baptized until May 23, 1875 (by the Rev A Rudolph) in the First Presbyterian Church of Ludhiana—an unconscionable delay after birth by parents even remotely of the belief that sin may be inborn.

The missionary compound embraced a number of acres surrounded by hedge or fence. In earlier days it had belonged to British officialdom but now it was ceded to the holier cause. There stood a church, a school for the children of the missionaries, store houses, and quarters of various kinds for the missionaries themselves and their families. Also present, a printing press.

The language of the country about, was Hindoostani. In this the elder Wherry had long issued tracts to the natives. For three years past he had added a visiting weekly, gently called the *Light Disseminator*. It is not strange that out of this atmosphere the subject of this biography was shortly to emerge more adept in the local tongue than in his inherited English. Moreover, the Indian children who frequented the compound seem to have interested him in deeper fashion than the sons and daughters of Christ's followers. Thus it was foreordained that he should retain throughout life a hidden reactivity to their silences; and to the gospels of cunning of the Orient. For the rest he rode a pony or played with zest upon a violin; and when he disappeared for worrisome hours from the compound, it was to watch butterflies and birds wing their ways about or to fly a kite. But not in quiet western fashion but with glass knives attached to tail, to swish across the holding line of another's starry hope. This wickedness of a Sunday secured him a beating—also a scar to his memory, and a break to his faith in paternal infallibility.

His precocity received a set-back at ten. Someway, he caught the scarlet fever. When in the third week of it, and the family had committed his soul to God, the missionary, Dr Sarah Seward stepped in. Dumping the comatose form into hot water, she brought consciousness, sweat and a series of life-long scars to the unfeeling body. (Thirty years later in Cincinnati, Wherry was to make payment for this in kind—

but without the scars—by saving the lives of some kindred missionaries of Dr Seward returned out of the East!)

Family opinion held the mental effects of his scarlet fever to be rather enduring. Sister Lillian used them to explain his weakness in arithmetic—a weakness scarcely evident in the close figuring he was to be called upon to do for thirty years. "He forgot all he had learned earlier," she once said. Well, as the evidence was to show, he had not forgotten how to read; and as to writing, here was matter for debate unless it was granted that in the submission of the sounds of the two languages which he knew to paper, the boy had anticipated the modern and phonetic method of spelling by some fifty years. (What might any sensible boy be expected to do with an English in which *ite, ight, eit* and *aet* all sound alike; or a Hindoostani in which the *a* comes out so short that it is written *u*?) At thirteen he wrote from the country into which he had been sent to recover from an illness, as follows:

Agra Fort
January 25, 1888

My dear Mama & Papa,

I am enjoying myself very much. Agre is a very nice place. We went to see the tāge yesterday & I think it is the most beautiful sight I ever saw. We went this morning to see Sukndra, which is 6 miles from here. I hardly ever cough now and am keeping quite well. I got a penknife this morning and a pencil, the penknife cost $\frac{\text{R–A–P}}{1-8-0}$

I have a very bad cold but no cough. I hope you are all quite well. tell Jonnie that I am going to bring him a horse if I can get one, and Some braclets. now I must end with love to all.

Your aff' Son
Willie Wherry

P s please excuse bad writeng.

This letter, like the rest, went back to the boy in due season properly scratched up. At the moment this was the father's educational method with him.

IN 1889 the elder Wherry had completed twenty-two years of missionary toil. The number of his children, also, had increased—to seven. Besides the older girls, Clara Eleanor

4 ("Nellie," her father's own child, never married, bread-winner and War-worker) and Grace (Grace Elizabeth, declared the business head of the *ménage*), there were now the younger, Lillian (beauty, wit and musician of the family, to become a missionary and a missionary's wife), Sarah Almena (generally known as "Minnie" and hating it) and Annie Griffith (the family thorn; marrying early she had gone west and written on stationery crested *from one devil to another,* "The newspapers say that at Chgo Uni they sang the college song the other day instead of the doxology. It wasn't true, I suppose, but it probably did just as much good."). And then there was a brother, John Llewellyn (to become a rancher). Because of the need for their more formalized education and the importance, too, of getting each to rest more democratically upon his own feet (many a missionary has stressed the "ruination" of his offspring wrought by the attentions of too many "native" servants), the father brought the brood to America.

To make the hegira possible, he had obtained for himself promise of a place with the American tract society. For a year the family fortunes centred in Leroy, New York, where all the children went to a public school. From here the now fourteen-year-old William was permitted to search out the relatives who had remained in Pennsylvania. This episode visited upon him a disillusionment which he never forgot. Back in the compound in India, he had been told of the Revolutionary sword that his grandfather had carried, and how, when he himself went to the United States, it would be his. Demanding what was his patrimony, he discovered that the good burghers had converted its steel into three pig-sticking knives. Perhaps it was this desecration of the ancient that subsequently made him hate all antiques. When grandfather's clock and other bits of old Pennsylvania became his, he stored them in a leaking barn.

After the father had been made the district secretary of the Society, he moved his band to Chicago, more specifically to a suburb thereof known as River Forest. Here the elder Wherry built a house (278 Ashland Avenue) which was for many years to function as one of the permanent post-office addresses of the always widely scattered family. It was from here that

ÆTATIS SUÆ iiii

young Wherry was started into Henrietta Starrett's school (the Kenwood institute) in preparation for college. Between her fears that he would never make the Latin, and his own that he was too old for the place anyway, he quit. Wherefore, a certain Doctor Bray entered his educational picture. What was his Christian name nobody knows; nor the origin of his doctorate. Some thought him an M D, more a Ph D, the most a D D, the weight of hearsay evidence lying heaviest with the last named. Whatever had been the designation, he was now busted. The elder Wherry had definite misgivings. He believed him, in plain English, an "atheist," which charge the doctor parried by attesting to the fact that a blue angel in India stood guard over him. The situation made for frequent calls by the father upon the tutor and admonishment that he leave the boy's religious propensities and their training alone. In sisterly mind—in fatherly, too—the boy's "dullness" at the "institute" and at home was still being debited to his scarlet fever. Such things are not impossible, of course. Yet, what in the boy's instance passed for dullness was nothing but a silence. There was germinating in his own mind a vine which was to strangle what had flowered so fully in his father's.

What the boy did beyond his lessons has never been disclosed. Attendance upon church and Sunday school could not be avoided, though he seems to have been less intense in these matters than the rest of the children. More nebulous appear certain organization activities which involved the bad boys of the neighborhood. The type, perhaps, stood closer to what he remembered out of India, so it was not long before he had them corralled into a "gang." Later in life he used to boast of his crowd's victories over the weaker tribes; besides which no more vicious attacks upon society seem to have been executed than the filching of tithes from ice cream freezers too carelessly delivered upon the back porches of a social class better off. But, as his college years approached, these romantic ventures gave way before a less material one.

Doctor Bray succeeded quickly and well with the preparation of his charge for college. It delighted the father. But his delight might have suffered setback had he known the content of discussions between tutor and pupil. The elder Wherry was case-hardened in fundamentalism; Doctor Bray—as we shall

WESTSIDE DAYS IN TINTYPE. FROM LEFT TO RIGHT,
SIDNEY PINNEY (METHODIST DIVINE), ROBERT WHITE (INDUSTRIALIST),
WHERRY (AT THIS TIME ATHLETE)

see—soft with agnosticism. To his indoors instruction, Bray had added the outdoors—not difficult in young Wherry's instance, who had brought the taste for it from India. Thus he came to make long excursions into what was still a deserted Westside. What he did on these tramps was look.

Testimony of what he saw appears in an old ledger of which he had possessed himself. Ominously marked "Private!" in huge letters, it opens at once, both front and back. The back carries a date: "River Forest, Ill June 14, 1893." (Wherry had just passed his eighteenth birthday!) There follow many carefully written paragraphs marginally noted as "No 1," "No 2," etc. Their content? They concern "Ampelis cedrorum, Coccygus americanus, Vireo olivaceous, Dolichonyx oryzivorous juv ♂," etc. Really, they are the titles of expeditions started at the above date but continued, as we shall see, into 1894, 1895, 1896. This is an excerpt from under the Coccygus title:

Upper part of body and head olive gray with bronze reflections, below pure white. The primary remiges and the primary coverts, cinnamon colored except at tips which are like the back . . . bill black above, the lower edge of upper mandible and lower mandible yellow. eyes brown; feet lead colored; tarsus scutellate and feathered like a hawks. 11.75 × 16. length of wing 7. length of tail 5.50. shot it out of a flock of three, which were feeding in some oak trees on the bank of the Desplaines River.

On another day he noted:

I went to the woods this morning at 5 A M and wandered around all morning without getting a decent shot, partly because the weather was cloudy and partly because a calf followed me around making a great noise in the underbrush. I shot and spoiled, a young male Black and White creeping warbler (Mniotilta varia) and a Wood Thrush (Turdus mustilenus). Spoiled them by having too large shot.

July 21, 1894, he recorded:

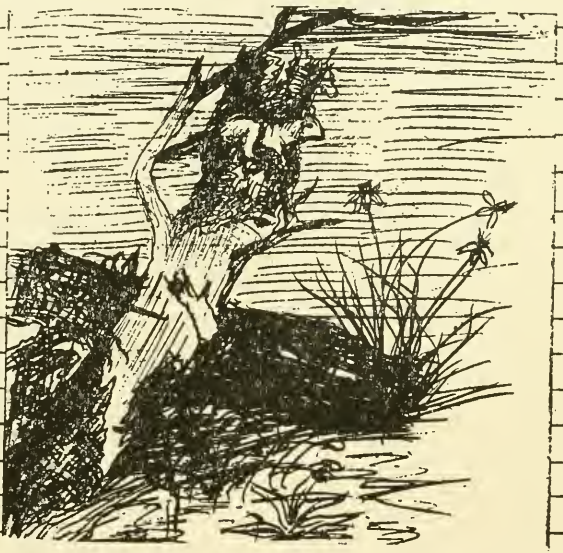
Went out at 5 A M and walked north through the wheat fields which were nearly ripe and noticed that the bob-o'-links were flocking in the fields. These were large flocks of females with

one or two males leading, and some dident have any males. I shot a young female without any greater coverts developed. I at first thought that they were pulled out by accident but since both sides were without them, I hardly think that probable. I never saw a bird before without the wing coverts. I came home and drew the bird.

THE last paragraph was written by young Wherry in the first vacation after his entrance into the father's old school. Through amalgamation with its erstwhile rival, the institution had now lengthened its title to Washington and Jefferson college. (The bloody shirt is still waved by the old-timers!) Softened somewhat in its sectarianism, it was still manfully "Christian;" and in its curriculum, stoutly "classical"—two qualifications of higher education for which the elder Wherry was strong proponent. In the junior's time the school already boasted a graduate list of four thousand. These, however, were no ordinary men. The lot numbered three hundred and fifty congressmen, legislators and judges, twenty governors and senators, four cabinet secretaries, along with an assorted list of thirty-two moderators, seventy-five college presidents and one hundred and seventy professors!

Wherry's academic record is still available in some carefully preserved dispatches made every three months by college authority to the father direct. School experts and others committed to the enterprise of forecasting the future of their wards on the basis of reports sent a dean, may toy with the following items. Of the five subjects of his freshman year, Wherry came out "meritoriously" (with a "1") in but two—physical culture and assigned reading. In Latin he made "2;" in Greek, "3;" in pure mathematics, "4." The "barely passed" of the last named subject then went into the chronic dead horse class as the on-coming years tripped him successively in solid geometry, trigonometry, radicals, quadratics, the ellipse and the parabola (the latter got him foul, twice). The market on physical culture rapidly softened to "2"—and clung there. His Greek never got out of the "3" class; nor his Latin out of the "2." He scored "1" on the Bible, when he started upon it in his sophomore year, but (for shame!) only "2" in the junior and "3" in the senior sessions. There appeared also a crescendo

somewhere around but could not
find it. I will however hunt again.
Entering the woods, I walked as quietly
as possible and after a little came
up close to some Chipmunks which
were playing around some rotten
branches that lay on the ground.
As soon as we saw each other we
both or rather all became motionless &
exchanged glances. One "Chip" especially
on my remaining quiet — regained
confidence enough to run up a log on
the heap.



But on my sitting down he came
to a halt just where he was.
I watched him for fully half an
hour but he remained motionless
all the time — probably in hopes
that he hadn't been observed &
would escape notice by clinging

A PAGE FROM THE *PRIVATE* ZOÖLOGICAL JOURNAL

of unexplained absences from chapel. Political science seems to have caught his fancy, for he was "1" throughout—and, of course, in the natural sciences. Physics he knocked down with a "2" but chemistry, geology, biology, and anatomy were all bagged with a "1."

But more significant of the mind of the boy than this collegiate satisfaction of requirements for graduation were some activities self-imposed of which none knew. They are evidenced in the notes added to his journal of exploration as his college years brought him a Saturday or Sunday off. To Chicago's dark Westside, he added the hills about Washington. There began, also, the insertion of clippings into the ledger. All concerned either the themes or the men of natural philosophy. Their subject matter lacked no catholicity. "Bits" appeared on general biology—bits on fact, or behavior, or taxidermy—but they were followed quickly by essays on the eagles of England, the quadrupeds of the Rockies (at once contemporary and prehistoric) and the woodland caribou of eastern Canada. Here and there were articles on the significance of the newly discovered temples of Mexico, the pygmies of India, and the life of the lost Livingstone in Africa; also a lot about the currents of the ocean, the storms above it and the winds that blow out of forests on shore. There followed disquisitions on the clouds, the comets and the meteors; and moon maps. Along with these, precious notes on the newly developing science of bacteriology and its human significance.

When Wherry entered college he was nineteen; but he knew already that matters such as these were the sweat of men's souls. Wherefore a third of his field book ended in biographies. The list of his idols is too long to quote but if a catalogue of the explorers, inventors and scientists that the nineteenth century brought forth is handy, it may be set down as the equivalent of Wherry's collection.

The sources of the literary materials for this so private library of his were various. Its most "expensive" acquisitions were magazine articles but the major portion of his store had been clipped from Indian or English newspapers—perquisites of the office, no doubt, which the father had held in India.

As time went forward the field notes matured; and to his animal notes he now added the botanical. Of these a drawing

book remains. His expertness as a draughtsman is revealed on every page. No wonder that his sisters were wont to write to him for "drawings," "portraits" and "caricatures." It was an ability that he was to use many times in his future work. When praised for it, he would smile and blush and then when speaking to an intimate add: "You know I once dreamed of becoming America's second Audubon." Such ambition did not lie beyond his reach; but "duty" (upon which he once wrote a story and an essay) always laid a prior claim upon him. This was the task at hand. Thus time and circumstance were to yield him but small opportunity to continue his forays into the macroscopic aspects of either zoölogy or botany; they drove him to consideration of life's microscopic forms, but even here always to those aspects that were living and dynamic.

But his hunger for more "literature" also grew. In 1896 he begged his father to send him what he could of "the new discoveries in science, especially in medicine." Never buried by the chaff of officialdom the elder Wherry wrote directly to the representative from the first district of Pennsylvania. Addressing his old college chum, the Honorable (and General) Henry H Bingham (out of Jefferson College in 1862), as "Harry," he wrote:

My son, William B Wherry, is a student at W and J College. He belongs to the Junior class and seems to be following the natural bent of his mind by making a specialty of natural science. Some time since he expressed an anxiety to secure certain publications of the National Museum . . . and said he thought they could be had from Government provided he could get the interest of some member of Congress who would aid in the matter. Naturally my mind turned to you & I advised his writing to you. This note is intended to introduce him to you. From childhood, when he caught beetles and butterflies in the Himalaya Mountains, my son has exhibited unusual talent in the direction of natural science & comparative anatomy. As a boy of twelve he would pore over Cuvier. I mention this to show that his request is not based upon a mere curiosity to see and to possess a rare book . . .

FIRST DAYS IN *W* AND *J*. THE SEATED FRIEND IS CHARLES WHITE (VICTIM IN THE *IROQUOIS* DISASTER)

14 Needless to add, young Wherry got much government publication in the next weeks.

But this paucity of the printed page was but a portion of a general need for the material that was to be chronic for all the Wherrys. How to keep mere life in the body was a problem over which not only the parents, but the children were long to puzzle. A missionary's salary could scarce cover a wife's needs and here were seven children to boot, with five of them girls. Their anxiety would find expression in almost every letter. The subject of a hat's retrim to a different style, or the revamping of a sister's party dress for a younger, would be the substance of more than one epistle. In his second year at college the father could send this praise to his boy:

Your letter with its clear statement of accounts came to hand. I congratulate you upon your economy—not only because it shows your sympathy with me in my endeavor to give you all an education on my very slender income but more because the practice of economy now will be worth thousands to you in after-life.

I have not found the money rolling in here as I had hoped & so I do not know if I can send all of the $20.00 . . .

To increase the family income young Wherry was going to work through the coming vacation. The father wrote:

If you go canvassing, you will need not only an outfit but some money for travelling expenses. I will try to supply you. The experience is worth more than the money. You may not succeed financially but I hope you will. If you do not, you need not take it to heart. It will only show you that that is not in your line. It is worth while finding out what we *can't* do as well as what we can. Teaching or tutoring would be pleasanter for a long vacation but such positions do not turn up every day.

When you travel avoid two or three things: (a) avoid going out at night with any fellows however fine looking—they are usually bad fellows who think entirely too much of both wine & women, (b) avoid displaying any money you may have about you, & (c) avoid accidents in travel.

The "canvassing" to which the boy turned was of the

"book-agent" variety—a somewhat feared designation in the last decade of the last century. But because his line was good, his success was greater than expected. He made his way into a goodly number of homes where the Christian education of the children was still insisted upon and thus managed to sell a colossal lot of maps of the Holy Land, done in seven clean colors and clearly portraying the travels of Christ and all the Apostles, the set mounted on a self-catching roller which permitted unrolling and rolling with the greatest of ease.

The financial triumph of one member of the family could not, however, mean much where nine cried for food. Wherefore September of 1895 found sister Nellie writing her brother as follows:

. . . Minnie's [Almena's] school opened last Wednesday, so Mamma and Grace have most of the work to do. I wish we could afford to keep a girl but it is no use to think of it at present. I'll be glad when I'm through here [an adept in applied art instruction, she was studying stenography and "business" as quicker means to more lucrative practice] and can get a position. Some women have commenced taking lessons from me in china painting. . . . I wish I could get up a small class, enough to get myself some clothes if nothing else. . . . What do you think of the Americans beating the English so thoroughly in athletics? I think that what Mr. Houser said this morning has a good deal to do with it. When an American is training he does not use tobacco or drink but most Englishmen think they can't live without their whiskey and soda or brandy. One of the girls in our class was cheating this morning so the man who had charge of the examinations tore up her papers and she will have to drop into a lower class. It is too bad but it serves her right and will be a lesson to some of the others.

Such direct or indirect instruction went to the feared-for one at college in almost every letter. How to get along on little was the common theme, but moral or spiritual precept was still commoner. The father's convictions in such matters were, of course, never items of debate. Nor were they in the instance of the elder sister, who in the stress of India and now of Chicago was, of all the children, most obviously her father's

 counterpart. Mother was a bit more tender but in nowise less definite, as will be seen.

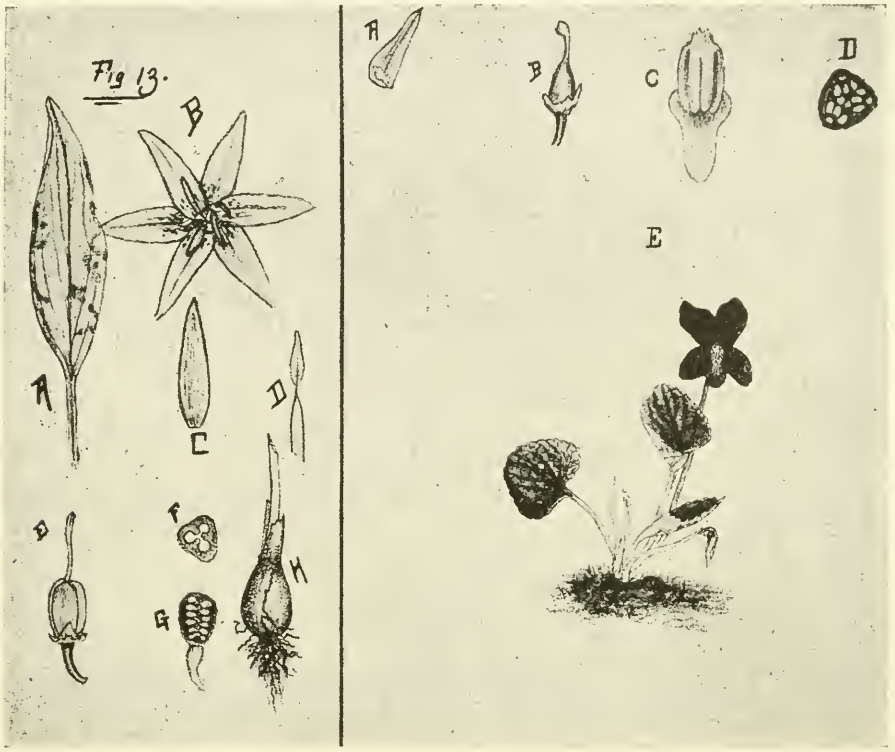
When, as sophomore, the boy had made the college paper, the father advised: "Keep it clean & refined & elegant for the sake of W & J." To which he added: "By the way look to your *spelling—wheather* and *wasent* should be *whether* and *wasn't.*"

October of 1895 brought this news:

I am sending you herewith ten dollars—money is rather hard to get but this will keep you going till I can send more . . . I am glad to note that you have awakened to the necessity of *learning how to read.* Nothing is more important except to *learn how to hear,* so that whether you listen or read you may *grasp* what is good & hold it at your disposal. The practice of reproducing in writing the substance of lectures & books is very important. The term *Khuda Karta* means God works; & *Khuda J'ánta,* God knows.

The family worry about William's sustenance and his behavior was trifling, however, compared with its worry over his soul. As a matter of fact the embryo naturalist was in a hot spot, for the father tended the fires of Revelation on the one side even as the flames of science's new religion were scorching him on the other. The father had seen him study Cuvier; but from that hidden journal, which was his own, he had learned more dangerous doctrine. Here he had been in dialogue with Wallace, Darwin and Agassiz; with Huxley, Tyndall and Lyell. Subjects like spontaneous generation and special creation had been given a jolt; and the boy needed to find bed for them again. The business was upsetting. It made him propound some straightout questions to Doctor Bray who in the new year of 1896 sent answer. Excerpts from a tightly typewritten four-page essay read as follows:

Your letter contains no surprise for me. You have heard enough from my own lips to awaken in you just such thoughts . . . That Jesus was born of a virgin, . . . that his body arose from the dead . . . that he is of one substance with the Deity himself . . . Now nothing of this do I or can I believe . . . The universal principles of religion are true because in



A PAGE FROM THE BOTANICAL JOURNAL.
THE VIOLET IS BEAUTIFULLY COLORED

agreement with nature; the special are false because they violate nature. . . . There is no local heaven, there is no local hell; nor are there beings apart from nature itself, presiding over such places . . . These things are priestly dogmas . . . Everything in nature is but in some form or other, force . . . You are; but you are that form of it that partakes so fully of the nature of God as properly enough to be called an immortal being . . . The whole awful universe, the Grand Whole is a thinking Monon . . . As for praying to Him, prayer is only of use subjectively . . . We should pray because it makes us better; but you should never expect an answer when the answer would be in violation of the known laws of nature. Such an answer would be God contradicting himself; for God and nature are one and the same. Hoping you will continue searching after truth . . .

Your affectionate friend and old teacher

The junior at Washington and Jefferson could lay this communication beside such as the following from his father:

I hope you got my letter from Detroit enclosing money order for $10.00. Did you ever get back the ten you loaned to G——? We are having very hard times here and money is so hard to collect I sometimes hardly know what to do. I shall try to send you ten more before I go east.

We have been having a series of Entertainments in Chicago quite recently. First of all came Bob Ingersoll with his annual tirade against Christianity, the Sonship & Divinity of Christ, the Miracles & the stupid preachers and doctors of divinity who believe such things. . . . But then it pays to lecture at $500.00 a night. He told us this last time about the *loveliness of home*—he really had a Christian home in mind—and then went on to say that a woman should not be obliged to live with a man as wife if she did not wish to, and so of the man. He did not tell us how that arrangement could result in beautiful & lovely homes. He presented once more the exploded theories of infidels and agnostics as to miracles . . . and so on *ad nauseam*.

Such men, however, do immense harm by unsettling unstable and uneducated minds in the fundamentals of Faith and Morals. In a materialistic age like this, when many men are

rushing on madly to Atheism or to Pantheism, which is twin brother to Atheism, it is important that Christian men examine anew the ground upon which they stand. . . . The study of physical science has led many men to doubt the possibility of the supernatural. But on the other hand this study has been the revelation of God to others, as indeed it ought to be. The profoundest thinkers of the day see in nature the most stupendous miracle; the fiat "Be" is everywhere present and the *mysteries* of science are as numerous as those of revelation. The truth is, there is no contradiction between the word of God and the works of God. I send you a booklet which I am sure you will read with interest and profit. Now, as you have come to the time when you must have begun to think and perhaps to find points about which you may have difficulty, I want to say that nothing would fill your father's heart with so much pleasure as to have your confidence and to be permitted to do what I can to help you. I have helped many young men and whom should I delight to help so much as my son? A word of counsel here: Choose good Christian men as your advisers and helpers in these matters . . . Hold to the man who stands for something positive & avoid the man who pulls down & destroys the faith of men & then leaves them to grope in hopeless darkness. The gospel of the Agnostic is a gospel of Despair.

After Ingersoll we had the Theosophists—both branches. It is astonishing that rational men can find anything in that whimsical system of heathenism and fraud. Men who reject a whole mountain of evidence for the Resurrection, will gravely tell you of letters written by the Mahatmas in the mountains of Thibet. Lastly we have the Salvation Army & the Volunteers. . . .

P.S.—If you write me of matters you don't wish all to see, address me *here*.

The postscript referred to his business address in Chicago, at 167 Wabash Avenue; and the pamphlet that had been inclosed was from the publication rooms of the American tract society in New York. It was that of the Rev W G Blaikie, D D, a *Letter to a Young Man of Science*, entitled *The Miracle of Miracles*. Father had noted upon it: "Read carefully & you will have an unanswerable proof of the Christian faith which will help you to help others who may be in doubt."

20 To father's dialectics, mother could add only her more direct statements of fact. On a Sunday in April she wrote:

. . . We have just got home from church. Dr Frothingham gave us a splendid sermon on the *life eternal.* I wish you could have heard it. How any one can doubt that God is a living God, and think that when life here is ended, all is over, I don't know. That is Ingersoll's doctrine. He preached in the city not long ago, at Dr Rusk's invitation, to the horror of Presbyterians. We have only to look at such people to see how *unlike* Christians they are, queer—sort of crazy it seems to me. May the Lord keep us all in the path which has led so many great and good men into the light of life eternal in Heaven. A native Alaskan is to be at the Y P S C E tonight. . . .

At times, naturally, the course of her Christian life (even in Chicago) was less satisfying. In fact mother's efforts at getting the hang of that town never did work out completely. Within these weeks she had visited Garfield Park "to see if they would give me some flowers—but they would not." Equally disappointing proved to be her trips to Chicago's great stores. Why would Marshall Field and Company not accept the half of the asked price? So they did in India. The routine of Christian service, even, was not always up to expectation. "This was communion day and only one joined church."

As summer approached, young Wherry once more turned salesman. It was another three months with the maps. At this time, too, he apprised his family of his desire to become a physician. It had long been a dormant ambition with him; but it had been fanned into flame by what he had come to know of his Pasteur, his Koch, and his von Behring.

His father wrote:

. . . Like a good correspondent you forgot to give me the information I asked for. How much money do you want to let you out and get home? I would advise you to read your letters just before you answer them and note the points of special importance. You will find this habit useful to you all your lifetime. I will however enclose a check for $30.00. Money is rather scarce now and I have to figure on the actual needs to make ends meet. . . . By all means be the Class

Artist if they want you. Take any honors lying around. See all the Artist does this year and then improve on it next.

I am glad you did not tackle that snake in the dark. You will do well to keep clear of water moccasins. They are deadly poisonous. Rattle snakes, vipers & copperheads are by no means uncommon in this country. It is not very safe swimming around after frogs—by lamplight—but science has its martyrs!

Your proposal to graduate at the top in the medical college is a good one and there is no reason why you should not. Don't underestimate your own ability. Genius is after all a capacity for hard work & close application. If you study a language next year you will do well to study German.

The medical colleges will no doubt raise the standard of scholarship everywhere. It will be some time before they carry out their rules. There are too many "wild cat" concerns yet in the country to make it feasible to reject all students below college grade. I wish you could be in a class where there would be only college graduates because the lower grade fellows degrade the lectures, professors having to lecture to their capacity. . . . With prayers for your success. . . .

SEPTEMBER of 1896 found Wherry happily started upon his final year in college. He had discovered a better place in which to live and had so written the father. Not altogether pleased with the form of his enthusiasm the father had answered: "Your room no doubt is *dandy!*" Yet, to aid in its equipment and to tell of the family, he continued:

I am afraid you will begin to think you will never receive the box of bedding. Well I got it off on the Wisconsin Central yesterday & hope it will get started by B & O freight on Monday. The box contains a pair of red blankets (sewed together) a coverlet, two sheets, two pillow cases, a pillow & a *cake* which I hope will not be too dry to eat. I shall have to send the testament by mail. . . . The girls are busy with a proposed entertainment—"The Mouse Trap." Like all actors and actresses they quarrel like cats behind the scenes. I am doubtful as to the whole business. . . . Keep in mind the idea of teaching for a couple of years as it is altogether likely that that is what you will have to do. I am likely to hear very soon that my sal-

ary has been cut down again. Everything looks in that direction. Fortunately Nellie can help this year. . . . I have not yet received my money from New York but as soon as I get it I will send you some. . . . With love from the whole family who unitedly pray for you every day. . . .

Before the month was out the heavy clouds forever upon the elder Wherry's financial horizon thickened. The Chicago branch of the American tract society had just ended the "celebration" of a seventh annual meeting. It had brightly "illustrated the varied character of the society's missionary work"—thousands of Christian books and tracts had been given away and "in 11,987 homes the colporters had been permitted to speak to the inmates on the subject of personal religion or to pray with them for God's blessing upon them." The treasurer's report, on the other hand, was not so bright. In fact receipts for the year had totalled but $1,113.77. As a consequence the father had to write his son:

. . . I am sorry to have to tell you a piece of bad news but please do not mention it to anyone and do not write of it to the other children. Owing to the falling off of our income, the Society has been obliged to discontinue a large part of its work and with it my term of office expires January first with possible extension until April first. It will be necessary [for you] to practice economy and to figure on doing some work to help yourself. I think it possible to set an arrangement whereby you could aid some good physician in his office and at the same time attend lectures, but of that later. Just now I am greatly perplexed what to do. You know I have always felt I ought to be in India. I cannot take time to tell you all the reasons for my thinking in this direction now. Enough to say that (1) God seems to be pointing me there, (2) Providence looks the same way, (3) I can thus best provide for the education of all. I am sure God will lead me aright as He always has, but just now I feel troubled lest I should make a misstep. Do not worry over this but use your opportunities so as to get along well in study so that when you graduate you may help us along a bit.

The ever-thoughtful youth was for quitting at once and proceeding into something lucrative; but the father thus arrested the plan:

Your letter, written under some very natural excitement, came to hand. There is no reason why you should not go on until you graduate. There is every reason why you *should*. You will then be in a position to care for yourself and by and by care for others as well. You will then be where I was as a young man, only you will have a much more thorough training. I believe you should undertake to teach—if it were only in a public school.

As the younger children were still in need of college training and minimum maintenance rates here or there were crucial items, a debate upon the setup at different schools followed:

As to the merits of Beloit I have no question & yet I do not think it is in advance of Wooster. The advantages [of Wooster] to me are (1) the tuition is free all around, (2) living is cheaper, (3) it is nearer Mamma's home & relatives, (4) other missionaries' wives live there, (5) the town is not only beautiful but very healthful, and (6) I hope that by and by Mamma can go out to India to be with me. If so, the younger children would have better care at the Livingstone & Westminster Homes than anywhere else while getting their education for a sum of money less than is possible elsewhere. I have thought the thing over well and while it is not impossible we may modify the plan, still I cannot now see anything so good as this.

I hope I can arrange with some doctor to take you in & put you through for about what you could do for him. If not, I hope you can get some kind of service whereby you can work your way. I have not yet had any reply to my application to be sent to India. The time when I must depart will depend upon that. Do not fail to understand that my reasons for going back to India are not a question of money. It is with me a question of duty. I did not expect to be at home so long when I brought you all from India, but my way seemed hedged about & I stayed under a sense of duty to my children. Now the way seems open & I hope to spend a good part, if not all my life in India. I should be glad if the Lord would lead some of my children in the same direction but this is with Him. There is a grand work in India for any one competent to do it. Let us all pray to God for His guidance that we may make

no mistakes in life. For your own part, keep right on but study *with a purpose* & God bless you.

Because of the father's urging, young Wherry continued his college. To this end sister Nellie's letters helped. In November of 1896 she wrote out of Knoxville, Illinois, where she was teaching at St Mary's:

. . . What do you think of Papa's plans? . . . His going to India will make great changes in our family. I am so sorry Lillie will have to stop going to college. Poor child, it will break her heart but I can't help more than one of you at a time. I was never so badly off for clothes as I am now. . . . Write to Papa for money just the same for I will send it to him and if there is any left over, they can use it. How much are your expenses this year a month? I hate to think of Papa's leaving us but I suppose it is for the best.

Some days later there followed:

. . . You need not feel so much indebted to me. It is only right that we should help each other . . . Mamma wrote the other day that if Papa decided to go to India she would probably go to Beloit to live instead of Wooster so that Lillie could go on and Minnie enter next year. Personally I should prefer Beloit greatly to Wooster. The people in the latter place are a little beyond me. . . . About your going to India—it would be a fine thing for you if you are not going to begin studying medicine at once. You would be sure of a place and salary for a few years at least and you could save money better. . . . If Papa goes it would be nice to go with him. I would be almost willing to turn missionary to do that!!

The call back to India, because of debate in the Board of Missions in New York was not, however, to come for several years. Only later was it known why. The grand old man had been deemed guilty of dereliction of duty when he left India to bring his children to the United States for their better education. The Board saw no good sense in the move—and would not forgive. Thus it was that the father needed to write:

I hope you have received the $15.00 all right . . . You will be surprised to hear that the Board of Missions does not seem

disposed to send me out to India. . . . At present I am perplexed what to do . . . if I can lease or sell our house here. . . . I hope you may have a good time geologizing. Only today did I carefully look over your *Pandora* [the college paper]. It is very good.

I will keep my eye open for books or magazines with articles on Progress of Medical Science. I interviewed President Harper the other day on the chances of your getting a fellowship . . . Should you teach Biology or Natural Science somewhere for a year, you might secure one. Or you might spend a year at Chicago University in special postgraduate study, and work into it. If you were "a good fellow" you might after three months get money from the students' aid fund. It would cost 300 a year and you could probably make one half of that by rendering some kind of service. . . .

Though importuned of the sisters to spend his Christmas holidays, "perhaps for the last time together" with the family in Chicago, young Wherry decided not—in order to save the railroad fare. The father answered:

I am in receipt of your letter saying you think you will stay over at W & J for vacation. I appreciate your plan & your motive and while we should like to have you here, I believe you are wise. We *do* need to practice economy & if you can save money this way, you had better do it. Could you not get a little *tutoring* to do to help along?

Nellie says she sent you a check for $25.00, so you will be set up. Let me know what fees have to be paid & when, and wishing you prosperity in study & a happy Xmas & New Year . . .

To this letter was appended a rather terrifying postscript:

Dr A—'s son W— disappeared two weeks ago and he has not a single clue as to his whereabouts. The chances are, if he is alive, he is in a troupe of actors or has gone to Cuba. He has well-nigh killed his mother & his father will be grayer for it.

Things had not brightened much as the first month of 1897 waned. Young Wherry, now in the home stretch for his degree, received the following from his father:

. . . I enclose you a check for $15.00 which will put you straight until Nellie is ready to send you money . . . I am on a half salary now & hardly know how things are going to turn out. No news yet from New York. I think Nellie can carry you through & I have relegated you to her for the present. I intended sending you your report which is excellent. You scored a "1" all around. If you could win a prize of $50.00 you could enter Chicago university & work your way through a postgraduate course. I had a talk with Dr Harper on the subject. He says there are many ways a young man can get through there. A special course in Biology & Chemistry would be splendid if it can be managed.

Nellie & Grace have gone back to work. . . .

Yesterday Ray Henry, Willie Worf & young Pixley ran away taking money from their parents. They are going to Texas & thence to Cuba. If they can be of any use there, they had better go. We will hardly miss them here, unless that the mischief they have been doing will cease to exist. . . .

Against the general depression, there always stood Grace's buoyancy. This is an example:

. . . I hope for Papa's sake that the Board will send him, as I don't think he will be content anywhere else. I don't think we need worry though; as long as we can buy a barrel of flour we won't starve. If Papa does not get anything to do we can all pitch in & do a little anyway. I think we ought all to try & work this summer don't you? Don't tell Papa this, but if he has nothing better to do by June, Alf & I will get married & instead of going to housekeeping will pay them $40.00 a month for board & that will help out quite a little. . . . Oh, we will get along all right so don't worry; we can dig in a sewer if we can't do anything better!!! So tra la & goodbye. . . .

In March, the father sent this wise advice to his son. The instance needs recording, for whatever the mentally atrophying effects of father's religious dogmatisms, they were offset by such stimulants as this. Ignorant of the self-disciplines contained in the boy's reclaimed ledger, the father wrote:

I am forwarding some pamphlets from Washington. . . . I

hope you will study the *form* of these on various classes of insects, and then that you will get a book and practice *writing up* carefully, in your best style, theses on every insect or bird you observe. Write as if *nobody else had written* and be sure to be *original, i.e.* that the presentation of your facts be as from yourself. Of course you will get your knowledge from others & yet I would *practice original investigation.* Study first for yourself & write it out & *then* compare with what others have found. The habit of original investigation is of infinite value.

Uninfluenced as he was throughout life by the boards, committees, and organizations slowly supplanting the power, judgment and decision of the individual in higher education, he continued:

I was talking with Judge Hibbard [Hon Homer N Hibbard, LL D and president of the Chicago tract society according to that association's letterhead] a few days since and asked him if he could not aid you in connection with the University of Chicago. He is on its Board, I believe. He would gladly do all he could and he thought that if you showed any special talent for natural science, biology, zoölogy, etc., he could get you a fellowship. This would give you a chance to pursue some special line of study under the best instructors, and would pave the way to a professorship. If you want to study medicine, that would be the best sort of preparation—indeed it would be possible to carry on most of your studies in medicine at the same time. Keep this to yourself & let me know what you think of it. To get it, you *must* study to write out your views on all the subjects you study. This ought to be required in college if it is not.—I will send you ten dollars soon. Let me know how you stand & what you will need to put you through to Easter.

As commencement days neared, the father wrote again:

Only six weeks and you will be out . . . When you leave college the struggle begins, only to end with life itself. I received a telegram yesterday announcing the decision of the Board of Missions. It is "not to reappoint" . . . I have an agreement with the Tract Society by which I remain here for at least one

more year. This will give us time to get fixed for the future, whatever that may be.—You spoke of a new suit of clothes & hat—those you must have. Let me know by return *probable cost* & I will send the money soon.

A week later the father could forward to his son "your report, which you will see is very good." But the problem of the suit had not been settled when the mother wrote on April twenty-fourth:

. . . I don't know whether I told you that they paid Minnie $45.00 for teaching. She has bought material for her graduating dress & has still enough to pay for a dressmaker to make it, after paying Mrs Starrett $15.00. She got a class pin, too, for $5.00. Mrs S was so pleased that M paid her from money she earned that she gave her a receipt to end of term, & said she needn't pay for her diploma or the elocution teacher who trains them to read their essays, or for the invitations to com. which the pupils usually pay for. So, see! . . . The concert [at Beloit] was fine & Lillie is spoken of, in the paper, as being the most popular & most beautiful girl in college, etc. I hope she won't be spoilt by flattery. I must try to get that paper.

What about your new suit of clothes? Be sure & tell us how much money you want for it, when you write next. Do you want any stockings, or collars which we can get here? There are sales often & we can get collars cheap. Tell us the number & whether stand up or lay down collars, & what color of socks. Do you need hand'fs? Be sure & tell me. . . . The latest news is that Minnie Tomlinson is engaged to that blacksmith here.

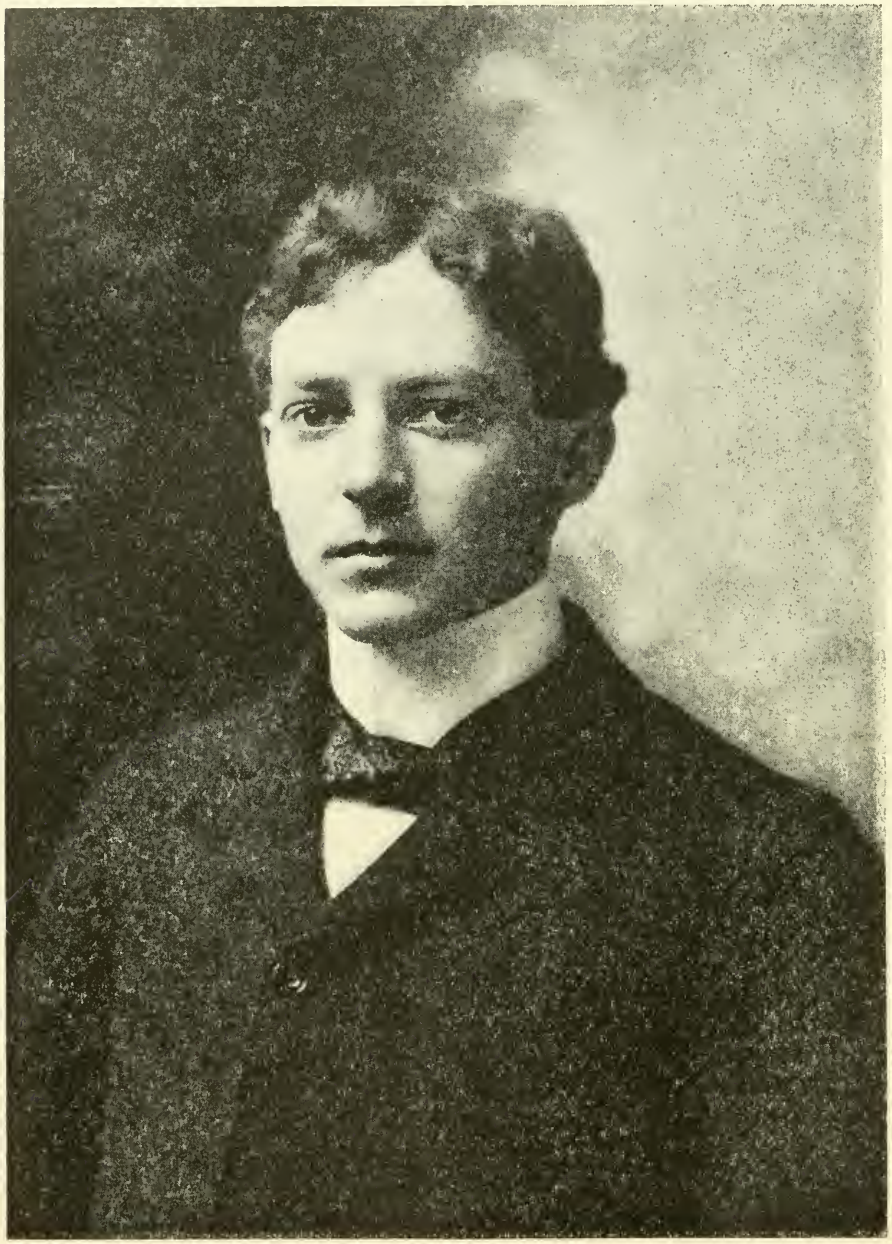
In the later months of his college career, young Wherry had brought better conviction to his teachers which fact put him in the honors group of those graduating. Mother was pleased; and so said (May 30, 1897):

I am proud of you, yes *proud* of you! I'm so glad you got through "a flying" and that you are an oration man. Just think of it!!! I daresay you are glad that you don't have to deliver an oration. You must have had grand times at your Serenade—to be feasted & taken into houses must have been fine.

I have been having a little holiday. I went Tues evn'g to Winona to Gen Assem. Your papa was there. I met the Everetts & many old friends. Mr Everett said that Elise was engaged to some young man who is in his first year in the Sem at Allegheny. He put his foot on the affair & told them they were not to have any correspondence for a year—then if they both felt the same, all right. He thinks she is too young to be engaged yet. She has very poor health, too. Prof Wilson of Allegheny told me that Jamie was to be his assistant next year. He says Jamie is a scholar but no preacher. Mr Pollock was at the Assem, also Mr Alexander & Mr Gohun.

Winona is a bluff on Eagle Lake, near Warsaw, Indiana. There are a large hotel & a good many private cottages & a woman's building. All were nearly full during the Assem. There must have been 3000 people there, though there were only about 700 delegates. Many of their wives came along & others were visitors. It cost us 1.00 per day for room & board. The lake is 2 ms. long & 1 broad. A steam tug takes people out. There are row boats too, but they were not in demand—it was so cold. Your papa is at Hyde Park church today on Tract Soc business. He is to go someplace this evn'g & is to hear Dr Barrows speak at the University.

The relatives could not stand by when William Buchanan Wherry was declared a bachelor of arts in June of 1897—that would have cost too much.



AB, *W* AND *J*, 1897

II

THE summer of 1897 marked Wherry a new and different kind of salesman—this time it was men's suits at Browning King and Company. The problem of their design never made great imprint upon him; but the quality of their woolens, yes. Financial background at home had not changed, but between what it could calculate and he had saved, entrance into Rush medical college was deemed possible.

In 1897, though situated in Chicago (the "plague spot for medical education of the United States"), Rush was a ranking school. Like the majority of western colleges, it, too, had started as a "private" enterprise but, early conscious of the weakness of such status, had "affiliated" itself with Lake Forest university. At the moment, this first university connection was being shifted to a similar tie-up with Chicago. (Gold letters announcing the event were painted into the panelled windows over the entrance to the college at Christmas.)

Rush towered from the middle of Chicago's medical *Quartier latin*—with the substrate and the possibility for great education therein exactly those which the imagination of a world has always associated with the French. Here art and arson, abject poverty and riches, priests and panderers were next door neighbors; filth and hygiene kissed in the alleys; Chicago's intellectual and social cream warmed their feet in the same hay that strewed the floors of the street cars in which the dregs from the glue factory rode. Men who saw medicine as a discipline that involved all society could ask for nothing more. From Rush, the observant might see everything.

The school commanded two brick buildings. The first of these, minareted and a glowing example of bastard-gothic, had risen on the northeast corner of Harrison and Wood streets after Chicago's fire; the second (celebrative of Chicago's World's fair of '93), lay across the street, and, flatter of front, housed the "laboratories" of the college. Chief content of the former were two great amphitheatres; while in the latter,

pathology, histology, chemistry and anatomy occupied successive floors. Less tangible but vastly more significant were some other details. The lecture building housed an ambulatory clinic; and students passed quickly from talks about disease to the sight of it. Yet more important was a connection direct, with the bedridden of the Presbyterian hospital. A second more indirect was with the sick or dead who lay kitty-corner across the street. Here stood the Cook county hospital of which the half of the attending staff had been, since time began, the men of Rush.

When Wherry entered the school the requirement for graduation in medicine had just been lifted to four years. Admittance to Rush, however, was still to any possessed of high school knowledge only. Here the father's ambition was technically disappointed, though, as we shall see, not too heavily. Rush was still a spring from which clear waters flowed. At the turn of the century it assuaged the thirst of a student body of more than a thousand not counting several hundred "practitioners" who via five-dollar visitors' cards gave themselves postgraduate clinical instruction. Teaching the lot was a faculty numbering four hundred. Neither group lends itself to quick description. Among the students were Syrians, Armenians and a Turk; several Blacks, Nipponese and a Chinaman; Canadians were common and South Americans appeared as stragglers. Every state of the Union could answer, here. The vast majority were the sons of ministers, school teachers, farmers or fresh-water college professors of one sort or another; and they came from the country, expecting to return there. The faculty was equally cosmopolitan in complexion, a third of it, if not foreign born, of foreign parentage and speaking the American language with foreign intonation. Thus, even though not yet so scheduled, the atmosphere about Rush was distinctly of "university" type, for here met men of widely differing mind, language and philosophy brought together by a common purpose—that of being of service to mankind. It produced a human alloy at once resistant and malleable.

If the school had a policy, it was the production of capable doctors—men able to meet a medical situation, whatever its nature, wherever found. This had been the tradition of Rush

for sixty years. To uphold it, her doors spoke a special welcome to youths with the will for medicine; and every entrant was supposed to have such. Once in, it was then up to him as to how much he would take unto himself of the educational repast set before him, for Rush's tables carried large and varied assortment. Police supervision was largely absent—men did their best because they wished to, not because they had to. The lock step and standardization still lay some years in the future.

In Wherry's student years a remarkable (and numerically large) number of teachers maintained Rush's common purpose. In medicine, James B Herrick, Norman Bridge, Frank Billings and Bertram Sippy were simultaneously active in bringing into hospital teaching a learning gatherable only from years of practical experience with sickness in the field; while D W Graham, Christian Fenger and Nicholas Senn (with J B Murphy soon to help them) were doing the same for surgery. J Clarence Webster (import from Canada) preached the doctrine that surgical gynecology was so gloriously triumphant because physiological obstetrics was so badly defeated. But the general idea that a sick man is forever the centre of interest in the medical picture and that the doctor must see the picture as a whole, was stressed even by those who made up the specialties. Ophthalmologists, dermatologists and neurologists were not afraid to treat constitutional syphilis or kidney disease; even as the surgeons were not afraid to limit their therapeutic ventures to straightout medicine; nor the internists to make final diagnoses in the fields of the specialties, and without consultation.

MARINE BIOLOGICAL LABORATORY
WOODS HOLE
LIBRARY
MASS.

This wide-angled view was characteristic even of the men who composed what have since become known as the preclinical, academic or scientific years of the medical curriculum. Walter Stanley Haines's chemistry embraced not only its fundamentals, but everything that to-day goes as biochemistry, diagnosis by laboratory methods, pharmacology, toxicology, pharmacy, drug therapy and forensic medicine, not to mention much medical history; Arthur Dean Bevan and Dean Lewis made dead-house anatomy live once more in surgical terms, while John M Dodson stressed for physiology (unhappily to minds too often too young to understand) that there was "greater interest in a live issue than in a dead tissue."

34 It could be said with truth that Rush's educational program was not yet in *rigor mortis*. There was still free movement between the departmental joints; and the students had so many open hours that the newly added fourth year could not be filled with "requirements" except as much of a third was repeated. Each, therefore, still had ruminant periods left; and those who chose could, by judicious "cutting," increase them indefinitely. To skip one instructor's classes for those of another was just good sense—the registrar did not care and it was up to the students to decide from whom they might learn most. How they employed their "leisure" was, of course, something different with different men. Some just loafed; others engaged in extra-curricular, money-yielding jobs; to the few, here was opportunity for self-assignment. The astute sought out the men of better capacity to teach; the still more astute apprenticed themselves to division heads most capable of pointing a way through the jungle of that day's medical thought. To this group belonged Wherry. As college man he had come with a record that was unusual. Francis Bacon, Thomas Browne and John Bunyan were not mere names. The English ballads he had diluted with the poetry of the East. But, as his hidden history showed, he possessed more. It was this that again made him stand out. He could draw, he could observe on his own, he had quantitative judgment, and he could come to conclusions other than those of the printed page.

Wherry stepped through the paces required to make him an M D quickly and easily. He did not however top his class as he had written his father was his intention. He had learned better; and so had become more than good catch basin of the temporarily acceptable facts of medicine presented by section masters.

NOT long after his entrance into Rush (it was in his second year, to be specific), Wherry knocked, to gain admittance to its laboratory of pathology, presided over by Ludvig Hektoen, professor. Born of Norwegian parents in Wisconsin and a graduate of Luther college, Hektoen was now just thirty-five. Nevertheless he was commonly referred to as "the

old man." Playmate in the years gone by, of Fenger, Billings and Herrick (the stars of Chicago's medical madhouse, the Cook county hospital), he had spent his last two in Europe. Most time had gone into Prag where Chiari was then active—he of whom it was said that he carried a microscope in his eye. Here he had been taught the ultimate in morphological pathology. The fact is remarkable, because what Hektoen taught his pupils was something quite contrary. "Pathology has given all the descriptions and made all the pictures it needs to," he said. Morphology, in other words, was dead. Progress, he insisted, lay in bacteriology, in immunology, in experimental medicine and in dynamic concepts of disease.

Hektoen's personal accomplishments in scientific medicine bulk large (descriptive essays on myocardial change, neurofibrosis, and vascular disease; critical essays on the ray fungi; early evidence for the invasion of the blood stream by microorganisms as opposed to the "toxic" origin of the peripheral manifestations of disease; early application of physicochemical methods to immunological problems; transmission of measles from man to man). Yet some would say that what he accomplished through his induction of productive workers into the field made him a still greater figure. Most were too young to recognize the fact that all their subsequent work was but the ripening of one of Hektoen's brain shoots. Generous in his bestowal of "ideas" upon those who sought him out, he was equally generous in aiding those who came to him with notions of their own.

When the men who were simultaneously active in Hektoen's laboratory in the years of Wherry's residence there are merely listed, they stand forth as an unbelievable bit of American medical history. Here were E R Le Count (the second professor of pathology in Rush, authority on the tumors and sharp critic of pathological theory); George H Weaver (an assistant professor, ditto, the discoverer of a liver cirrhosis-producing microörganism and the first of the scientific makers of antitoxine in U S A); H G Wells (soon to revise pathology in "chemical" terms and to become its professor in the University of Chicago); E C Rosenow (veritable Holstein for scientific productivity, and later the professor of experimental bacteriology with the Mayos); Thomas Reid Crowder (handicapped

by deafness, shortly to emerge the medical director and hygienist of the Pullman company); David John Davis (to make universal the peripheral distribution of the typhoid bacillus in *typhus abdominalis* and to become the professor of pathology and bacteriology in Illinois's College of medicine); Peter Bassoe (hesitant in speech but smooth in mental flow and headed for a clinical professorship in nervous diseases in Rush); Brown Pusey (gentleman in practice and scholar in thought, even though the undertakers have stolen this phraseology, headed for the professorship of ophthalmology in Northwestern University's medical school); Howard T Ricketts (inoculating himself with yeasts to prove their infectiousness, discoverer of the mode of transmission of Rocky Mountain spotted fever, and shortly to die of typhus in Mexico); Arthur D Dunn (equally at home in German or French, impresario of Voltaire, Flaubert, Anatole France and for his life-span professor of medicine in Omaha's two medical schools); Noble Wiley Jones (also of college breed, first worker in the arsenic intoxication hazards of western mining, the professor of medicine ever afterwards in Oregon's school); Joseph C Ohlmacher (farm lad out of Illinois, for sixteen years the director of an Iowa state institution, then the pathologist, bacteriologist and health chief of South Dakota and its medical school); Rollin T Woodyatt (a son of Chicago, imaginative roamer in chemistry's empyrean, to become the professor of medicine in his alma mater); F F Tucker (shortly chief medical missionary in China's province of Shensi); Willoughby Hemingway (ditto, but in the province of Shansi); and Alice Hamilton (already the pathologist to Chicago's Woman's medical college and soon, America's strident voice against the slow poisonings of modern employment); also, myself.

With the exception of Le Count and Weaver—who busied themselves on a floor above the rest—these men (including Hektoen) worked in a warren that was Rush Medical's pathological "research" laboratory. The space comprised a revamped janitor's flat—of which three rooms lay on a first floor and two, in the basement. Of the three upper rooms Hektoen had kept but one—the smallest—for himself. As to the equipment, each of the older workers had a kitchen table upon which to lay out his scientific belongings; the younger, half

a table. What the men lacked most was daylight. With Chicago herself ungenerous in the matter, such light as there was, got into the basement rooms only through four slit transoms. Two of the upper rooms were more fortunate. In the third, Wherry alternated space with Rosenow, since both had to manœuvre for light from the only—and laterally placed—window.

The men managed well, nevertheless.

Hektoen began their training in the sound school of technique. In this direction opportunity was large. Autopsies in the "County" or the "Pres" were everyday affairs and major portions of the cadavers found their way into Hektoen's laboratory for more detailed study. To these were then added all the amputations, tumors, and infected glands that a half dozen surgeons, working steadily, could deliver. But to the anatomical study of such human remains was always added a bacteriological (in fact, it was through Hektoen and his workers that Rush was of the first of America's schools enabled to boast an equipment for bacteriological instruction open to all the students). Weak men and the preternaturally bright died on Hektoen's treadmill. It left men like Wherry to be put upon "problems." Thus it was that he was soon engaged upon a statistical inquiry into the segmentation and fragmentation of heart muscle.

What was unearthed in these more private quarters became the subject of essay or demonstration at a "conference" that Hektoen was wont to call each month. It was further good training, for here the men learned to be brief, speedy in making a point, critical. A story or two of his method bears repeating. "Are you sure of your opinion?" he would ask after argument. Answered, yes, he would advise: "Then publish it." Toward this end, too, he helped them. How many minutes would be allowed a venturer upon the floor? "Twenty," would come the cold answer. When the aspirant would then submit his paper for revision, Hektoen was likely not to look at it. "You are certain that it will take but twenty minutes?" "Yes, Sir, because I read it out loud against the clock." Whereafter he would order: "Then take it back; and do it in ten." This was another of his literary criticisms: "You are sure that you have framed a good introduction and a good close? A decent article requires both." Told that the two demands had been met, he

 would advise: "Then cut them both out and get right into the middle of it."

Wherry's own ability in literary line was not mean and yet such instruction did not fail to influence him. In his fairly long list of "publications," closeness of diction and accuracy of statement are characteristic. One of his most important contributions to medical science (his discovery of plague in the ground squirrels of California) is but twenty pages long, with much of this space devoted to illustration; and another (his discovery of "tularemia" in man) is definitively set forth in a ten-page account; his description of the blood coagulating factor extractable from normal lung, occupies eight; and numerous others do not take in four.

As the quality of a pupil's output improved, Hektoen entered it upon the programs of the Chicago pathological society. By 1898 this had become peculiarly "his." He had just been made its president and in this capacity he was to continue four years. In its arena the public was first to know that a new figure had been born into medical observation and opinion. At various times there, a man named Wherry had demonstrated some "specimens." But in the third year of his medical course he brought an article [*1*] to print. It was an elaboration merely of some of Hektoen's earlier observations on histological change in heart muscle and important only because his first. In the absolute it did not amount to much. Even as it was being set in type Wherry was shifting the point of emphasis in his pathological philosophy—from main interest in the tissue reaction to that of its causative agencies. His reports of "autopsy" findings out of the laboratory were to bring the first indications of this change as they accented increasingly their bacteriology.

THE stress of living eased somewhat in the Wherry household in the summer months of 1900 and the medical student did not have to sell any more clothes to keep going. The father had been called back to India, taking mother and Nellie with him; and the other girls had married. It gave Wherry opportunity to consort for a season with America's greatest figure in parasitology—Theobald Smith—then active

in Harvard. Forty-one at the time, Wherry knew him as the man who at twenty-seven was the first to prove the transmission of a disease (Texas fever) by an insect carrier. In a later decade he had insisted upon the difference between human and other strains of the tubercle bacillus and then described the sudden death consequent at times in diphtheria upon a second injection of "antitoxine," correctly ascribing the disaster to a "sensitization" of the patient by the first injection of foreign protein (horse serum). (The "Theobald Smith reaction" constitutes the opening paragraph of that long chapter in "immunology" headed "anaphylaxis.") Under this master Wherry broadened greatly his philosophy of biology and parasitism, of action and reaction, of life and death. What he learned he added to what he had received from Hektoen, and many of the teaching hours toward which Wherry was heading were to be made glorious for the students by his recitation of what he knew of the accomplishments and the thoughts of these men.

Upon his return to Chicago for his senior year in medicine, Wherry reëntered Hektoen's laboratory. His bacteriological findings in the instance of an acute death again reached the floor of the Pathological society, were printed [2] and republished *in extenso* a year later [3]. They concerned carbuncle. A barber had developed a pimple on his upper lip, gone feverish, and to the hospital. Twenty-four hours later he had died, with Hektoen making an autopsy. Clinically there had been the signs of a septico-pyemia with dead-house findings confirming the fact. Wherry had isolated a pure culture of the *staphylococcus aureus* not only from the lip but from all the internally situated organs.

By title, and superficially viewed, these second and third papers covered a case report. Usually such are mere numbers added to medicine's curio catalogue. In Wherry's contribution, however, there was something more. It evidenced, first, what was to prove his way of work and thought. His subject was just a slice from any day's routine—but, as the future was to prove, it was always out of the commonplace that he was to extract his rounded pearls. Second, he was presenting a bacteriological account; but it was preceded by a clinical and an anatomical report which clearly exhibited his expertness in all

these fields. (His skill in the succinct delineation of a medical picture may be compared only with H Curschmann's powers.) The longer story ended in some (large print) *Considerations.* Philosophizing from the fact to the abstract principle, he wrote: "Suppurative phlebitis soon results in infected thrombi, detached portions of which travel through the venous circulation as mycotic emboli. . . . They lodge in the capillaries of the lungs . . . eventually in any of the organs, skin, or long bones. . . . With proper bacteriologic diagnosis established, antistaphylococcus serum . . . might prove a valuable aid to surgical intervention."

1901 saw Wherry at work upon items well beyond the isolation stage merely of pathogenic microörganisms. Sir Almroth Wright had given propulsion in England to Pasteur's "vaccine" studies (the development of immunity to a disease by the injection of the killed organisms responsible), had fished up again the Metchnikoff concept of immunity (that the white cells of the blood engulf and kill off the offenders) and had brought forward his evidence for the existence of materials—the opsonins—able to further phagocytosis (the engulfing half of the problem). Wherry became an enthusiastic laborer in each of these fields, though what he found and believed at the moment was not to receive public mention for several years.

In June of 1901 Wherry was declared an M D by Rush medical college authority.

For a season he continued in Hektoen's laboratory. What he wished was a place there as teacher and the chance to continue his studies; but the queue of good men was long. When autumn came, Wherry therefore seized the opportunity to become an assistant (at a thousand for the annum) to Edwin Oakes Jordan, whose habitation was in the gorgeous buildings of the Midway that were the University of Chicago. Jordan was thirty-five, in charge of bacteriology, though only an associate professor. With him Wherry was busy a year and a half. Most of this time went into the better equipment and management of the students' laboratory; the rest into didactic instruction. His ability in these lines increased the enrollment. But even better was the realization on the part of some of the students that here was a teacher of peculiar gifts. Though his

MD, *RUSH*, 1901

delivery was never spectacular and his voice low, those who moved up close were strangely fired. Here were terseness, fine English, a humor which permitted him to laugh even at himself; above all, an ability to make an auditor reactive to the eternally romantic hidden in the drama of all living things.

Besides which Wherry brought forth a paper. It concerned the permeability of bacteriological filters [*4*], a labor begun in Theobald Smith's laboratory. In it he stated with finality what later observers were to rehash for a decade—that porcelain filters differ from each other and are unreliable among themselves; that their pore size determines whether an organism can or cannot be separated from its medium; that filterable organisms are probably not ultramicroscopic; that certain organisms, in time, actually grow through the filter walls.

Jordan's laboratory, however, was the *locale* of another adventure. Marie Eleanor Nast of Cincinnati (the daughter of Albert J Nast and the granddaughter of William Nast, successively the editors of German-American Methodism's greatest voice, *Der Christliche Apologete*), as honor student out of Goucher college and scholar in biology at Woods Hole, had chosen to spend the second year of her traveling fellowship in a western university; and had picked Chicago. Intent upon becoming an M D, she had heard of Wherry's qualifications and registered with him. Wherry shortly found himself impressed of her scientific sense—also of her black hair and the red rose she always wore.

III

THINGS moved fast for Wherry when the autumn quarter of 1902 opened in the university. There was his teaching, of course; and those more personal labors that go by the name of research. Hidden deeper in his heart was the continuing need to be of material help to his family; wherefore a look about for prospects.

U S had completed its conquest of the Spaniard, had bought and paid for a brand-new set of islands in the western ocean, and had "pacified" them. At the moment it was broadening this spiritualizing influence via the establishment of government laboratories in Manila, to cost millions. To order them, men were needed. Specifically, a pathologist and a bacteriologist were being sought at $1800 each; and the Civil service commission out of Washington had been deputized to broadcast the call. In September, Wherry entered the lists. I had myself migrated to California by this time where he wrote me (December 19, 1902):

I haven't gone into politics but I am making money fast. Two weeks ago I spent 5 plunks and thereby saved 95. Last Saturday I again invested 5 dirty dollars and if I hadn't dropped a 20 dollar bill in a hasty movement, I would again have saved that amount. As it was, I only made 75. Two weeks ago, dressed in my only black suit, I invaded the clean but bare parlor of Beecher Hall and had a lovely hour with *Her* . . . I see my finish next quarter . . .

But before this quarter was to start—on December 27—telegraphic and official word informed him that he had passed the government examination, had gained his coveted appointment and that under U S army orders he would report, ready to sail, at San Francisco on January first.

His appointment to the pathological division of the biological laboratory of the Bureau of government laboratories in Manila had been made on the basis of grades in a competitive

examination. For the open posts any qualified citizen was eligible and some eight candidates had come forward. Though trained of Hektoen, Smith and Jordan, Wherry was given a low mark for "experience." Nevertheless, when the final averages came in, he had made top score. Second in line, stood Paul G Woolley (then twenty-seven, the son also of a clergyman, with special bringing-up in pathology under Welch and Adami). The outcome of the examination started the two upon an enduring friendship (previously they had merely met when Woolley had spent a summer in Hektoen's laboratory). They reached San Francisco shortly before the day of embarkation on the transport *Sheridan*. Of what happened on the ship, Wherry wrote thus to his mother (January 24, 1903):

Pacific Ocean about 400 miles
east of Guam, Ladrone Islands

Dr Woolley & I arrived in San Francisco just in time for the New Year's Eve celebration. We put up at the Palace Hotel in style. Martin Fischer and Hoyt Barbour who is asst Chinese inspector, were very good to us—we had dinner with Martin and in the evening, Hoyt showed us through Chinatown. . . . This transport is a fair sized boat and the accommodations are good though not sumptuous. It was pretty rough . . . The transport, as you may surmise, contains a funny mixture of humanity. There are a company of soldiers, about 20 officers, officers' families, young ladies going out to be married, etc. Some are very nice, some are "so-so," some are n g.

Most of us have nicknames—Dr Woolley is called "the typical college student." I have been styled "the ecclesiastic"—probably because I am dressed in black & look upon life too seriously. A friend of ours—Capt Hutchins, a soldier of Fortune in S America & the Philippines, tall with black hair & fierce mustache—goes as "the brigand"—etc, etc!

Day before yesterday we spent at Guam. We have a naval station & penal colony there. The island is of typical volcanic origin, surrounded by barrier reefs of coral and covered with cocoanut & banana groves. Capt Hutchins & I took a native cart (without springs) and rode 4½ miles to the naval station at Agaña. The officers gave us a hearty welcome & dined us at their club. We were beautifully sunburned and look like boiled

Form No. 1237.
March, 1902.

REPORT OF AVERAGES Pathologist Bacteriologist EXAMINATION.

United States
Civil Service Commission,
Washington, D. C.

To W B Wherry
Chicago Ill

The averages attained in the examination taken by you are indicated in the table below.

SUBJECTS.	Averages.	Relative weights.	Products of averages multiplied by weights.
First—Microscopic technique (Sheet 1)	99	2	
Second—Bacteriologic technique (Sheet 2)	96	4	
Third—Pathogenic bacteria (Sheet 3)	98	4	
Fourth—Hematology (Sheet 4)	87	2	X
Fifth—General and special pathology (Sheet 5)	94	4	
Sixth—Training and experience	85	4	
Last Sheet—Personal Questions (not rated).			
TOTAL		20	
AVERAGE PERCENTAGE			93.20

THE REPORT THAT MADE WHERRY PATHOLOGIST
TO THE GOVERNMENT LABORATORIES IN MANILA

lobsters. While at Guam, Capt Hutchins & I visited Mabini—Aguinaldo's secretary of war. He is kept on the island because he refuses to take the oath of allegiance to the U S. He is paralyzed from the waist down and appears quite emaciated. I don't believe he will live long. He has good quarters with Gen Recarte, one of Aguinaldo's generals who also refuses to take the oath of allegiance. We had to wait until he was through his "siesta"—so the officers evidently treat him well.

I have never felt better in my life and am only anxious to reach Manila and get to work. . . . The Pacific Ocean is certainly a great desert—we didn't see a sign of life, barring a few birds & flying fish, between the Golden Gate and Guam—a distance of over 5000 miles, a three weeks' trip.

Manila, January 27, 1903

Arrived O K and am putting up at the Oriente until further orders.

Thus the trip over for the two men had proved uneventful except for a discussion. The rules of their competitive examination had declared the high man the pathologist, and the next high, the bacteriologist to the Islands. Woolley pointed out to Wherry that his larger interest lay in parasitology. What more natural than that Wherry should, in the face of such argument, trade his primary title to Woolley, for the latter's secondary!

On the day after landing, really to make instant return of some money he had borrowed for the extra costs of his passage, he penned me a brief note; whereafter "she" became the recipient of most of his letters. One dated February 2, 1903, said:

Well, here we are located in Manila, a very interesting and expensive place. We have a nice corner room completely open on two sides in a large Spanish-style house with four blue columns in front and a tropical garden behind. Our windows overlook the garden. The house is in a section of the new city, San Sebastian, north of the Pasig river which separates the old walled town from the new. Our number is 183 Calle San Sebastian. We consider ourselves remarkably lucky . . . The laboratory is within easy walking distance which is a point of vital importance, for transportation facilities could not be

worse. When we grow wealthy we will own a horse and carromata. As it is, we either walk (no one, but natives and low white trash, walks in Manila) or loaf along until we can hail an empty one. I certainly had a good attack of the blues shortly after arrival but as I am endowed with a submissive spirit, I succumb to the inevitable. Things have turned out just as I expected but not as I hoped. The Government Laboratories consist of a small building back of the city hospital. The equipment is fair. But what discouraged me was to be informed that routine work would be my chief occupation. So I am engaged as I was during my senior year at Rush. However, I intend to put in extra time. So far as I can see now, if emergencies in the way of epidemics arise, Dr Woolley and I will do the routine work while someone else will get the credit. Well, here I am writing down my troubles instead of hunting up a policeman. At any rate we will see and learn many new things. Dr Hektoen's suggestion that on my return I give a course in tropical diseases, has keyed me up to making the most of two years. This morning Dr C F De Mey, a big, jolly, good-looking Frenchman, who has charge of the lepers at San Lazaro Hospital, took us out there and showed us many interesting and horrible cases. He also lives at 183 but soon leaves to establish a colony for the Islands. He is very enthusiastic about a method of treatment he has discovered. There has been no cholera in the city since January fifteenth though many cases occur daily in the provinces; and bubonic plague has almost died out. The health department here is excellent.

By February twelfth he was again on the eternal theme of his finances:

I am enclosing a postal money order, Martin, which you will no doubt be glad to receive. . . . Manila is a great place. . . . We have fallen into more or less routine which will last for a month or two when Freer promises us plenty of opportunity for research. . . .

The reference was to the altogether remarkable Paul C Freer. He had, in 1903, when just forty, been appointed the "superintendent" of the Government laboratories. An M D out of Rush at twenty, he had made himself a Ph D out of Munich at twenty-five. After a season with the great Perkin

 in Manchester and some itinerant teaching in the U S, he had concluded fourteen years as professor of general chemistry in Michigan before starting to Manila. Wherry's letter continued:

There is a 6½ million dollar appropriation for the laboratories which are to be a central institution where scientific work for the group of islands will be done. The new building will be completed within the year. . . . *Great Scientists* from the U S will be invited to come and investigate any old thing they want . . . How would you like me to get you a bolt of Chinese silk *mucho fina?* . . . I had a nice letter from Miss Nast yesterday, so am feeling fine to-day. . . . Nearly everyone working in this lab gets something—mostly amœbic dysentery. I expect to have beri-beri . . .

Another day he wrote:

. . . Woolley expects to study rinderpest. I am going to study beri-beri partly because Hektoen suggested it and partly because there is an excellent opportunity here, for it is practically endemic in Bilibid Prison and epidemic in Manila during certain seasons of the year. Though when I look at the bibliography and see what an immense amount of work has been done on it and by good men, too, it nearly paralyzes me.

February 21, 1903, he made this report:

We have plenty to do now, for plague is starting up. There were six fatal cases during the week. I had three plague autopsies in one day on primary bubonic followed by septicemia. The board of health has been lax but the laboratory is stirring them up, for we get plague rats among those caught and sent in. It is a horrible disease, just like anthrax. I will send you some slides, for they will interest you.

On March 22, 1903, in a letter headed "Hot Season," he added:

The climate here is productive of the most delightfully lazy feelings. If we weren't so busy, I would be a victim of Filipinitis. But with plague and cholera on the rise, we have plenty to do. . . . Cholera is really a most frightful disease. I am trying to do a little work on it but cannot accomplish much, for we have not been relieved of our routine. I can get in some time on Saturdays and Sundays though. It took me almost

MANILA'S FIRST U S GOVERNMENT LABORATORY

three weeks to make up my media. Though I am using methods of which Martin would highly disapprove, I find it interesting to make comparison of the different strains of organisms isolated from plague and cholera. I am about to carry out some work on toxine production by the cholera spirillum.

April 7, 1903, he wrote to his mother:

. . . Thank you for the extract from the Civil & Military Gazette on "oysters." It particularly interests me for I had some work to do on oysters a few weeks ago for the board of health. These Philippine oysters are all more or less dangerous and the Board of Health forbade their sale; strange to say, since then, there has been none of the cholera-like infections which were quite frequent. Yes, we are very comfortably located and have good food. Still, we find $45.00 a month rather steep and if we get a chance, Woolley & I will keep house. A couple of friends of ours do so and quite reasonably, too.—I don't go out anywhere in the evenings excepting that Woolley & I drive to the *Luneta* & hear the music two or three times a week, and then we go to Medical Soc'y once a month. Our work requires pretty steady reading & we usually spend our evenings that way. We bought some interesting photographs the other day from the Government photographer. They represent various peoples in the Island of Luzon, their dress, homes, etc. We cannot send them away though, or the photographer would get into trouble. One of our chemists here, a Mr Stangle, is quite an anthropologist & philologist, knowing many languages well. He is studying the origin of the Philippine tribes and has much evidence to show that the aborigines here—Igorrotes—are quite like the aborigines of India—the Bhils, etc. He is anxious to get a vocabulary of Indian words to compare with the Philippine, and asked me if I could in any way get hold of such a vocabulary. I told him that I would see if Papa could do anything. So I enclose a list of words.

His laboratory chum out of the Chicago days, Joseph C Ohlmacher, cheered him from the Independence state hospital in Iowa (April 8, 1903):

Even your routine, at first anyway, must be exceptionally interesting, and I envy you your opportunity of doing autop-

sies on plague and cholera, though not your work in tents as morgue . . . I have notes on interesting cases here but have lacked the nerve to publish them. So many fool articles, half dressed and rachitic are flooding the journals. . . . I wish I were with you . . . if only to hear you say "By George, Ole, I'm putting up an awful bluff."

At the same time his sister transmitted, with a letter out of Chicago, the following signed statement:

Received April 4th $50.00 from W B Wherry

Spent life insurance	$12.91 Ap 15
For John's clothes	$20.00
	$32.91
In Northern Trust Co Bank	$17.09

The reference to John covered a new financial item that Wherry had assumed—he would see his younger brother (the last of the children) through college. Much interfamilial correspondence was to debate not the fact but the nature of this collegiate training. The father stood out for the classical in the established "W and J;" the boy himself, for the agricultural. For a year the father won; whereafter the son managed his own future in the University of Illinois in Champaign-Urbana. Commenting on the situation in April, the mother had informed Wherry: "John is back in Chicago. He has had enough of mines but seems to have saved a good deal of money, $100, but some of that will have to go to clothes & travel."

Descriptive of Wherry's own activities was a letter sent Miss Nast on May 11, 1903:

. . . There is a great deal of sickness in the city and the Civil Hospital is overflowing. Our laboratory force has also suffered and I am sorry to say that poor Woolley is in bad shape. I am afraid that he is of too nervous a temperament to stand the tropics well. He had some trouble following an injection of 20 cc of plague antitoxine, after which one of those irregular fevers followed. Now he has an inflammation of the shoulder and knee joints. He has lost about twenty pounds and I am afraid that he has, or may develop, tuberculosis. We made him go to the Civil Hospital but he would only stay there three days. We are going to make him get out of this place

for a couple of weeks. Then, Dr Freer is ill. Mr Clegg, another of our men, was ill. The hospital staff are nearly all laid out with something. So you may be sure that those of us who were born to be shot, hanged or drowned have plenty to do. This interferes seriously with research, but to tell you the truth I rather like it, for one feels as if his labours were not altogether lost—as they are when research is without results.

I am beginning to think that I must be fitted for a tropical life. One continually sees interesting fevers and pathological conditions of which no one seems to have definite knowledge. Soon, we are to start a Journal here. The Manila Medical Soc'y is sponsor. It will probably be entitled "The Journal of Tropical Medicine and Allied Sciences." The delay is now great when one wishes to publish anything.—The mail leaves tomorrow. I hope that you have decided not to study during the summer. It will be much nicer to dance, fish, row and swim—for Martin once told me that you were a famous swimmer. I helped disinfect a ship on the bay the other day (Sunday!) and the water looked *so* inviting. If it hadn't been for the numerous stinging jelly fish and a couple of sharks, I would certainly have fallen overboard accidentally, on purpose.

He continued this recital May 25, 1903:

I am growing weary of "expecting" the *Sumner* (already overdue 10 days). There are a thousand sacks of mail due and if they have all gone to the bottom I am going to do some swearing. It seems an age since I received one of your cheery letters.—Dr. Woolley is at Baguio, Benguet—at the north of Luzon—where they have a temperate climate. It seems hardly possible that there should be such a place in the Islands. We expect him back next week. I will be glad to see him for I am tired of this bachelor life. Then, we need him at the laboratory where there is too much to do. I have had to lay aside most of my own work and am now up to the ears in water, soda, and lemonade analyses—not to mention the regular routine and *post mortem* work. Dr McCoy, of the Marine Hospital Service, who is staying at 183 San Sebastian, is much interested in pathology and as he is a good clinician we frequently go out in the afternoons to San Lazaro Hospital to look over the plague, cholera and smallpox patients. Last week

we happened to be there when a fire started in the Trozo district. Its Philippine population lives in nipa palm and bamboo shacks. A strong wind was blowing and in less than an hour about a square mile of them along the cholera detention camps was destroyed. We happened to be the first white men on the scene, for we ran down into the district as soon as the fire started, and it kept us busy hustling the natives along. During the excitement we managed to cut a good many horses loose, carried a paralytic to a safe distance, helped carry trunks, etc. until I thought I was dead, though Dr McCoy kept it up beautifully. The most precious possessions of the average Filipino are his fighting cocks and we ran across many an *hombre* carefully tying his roosters together by the feet while his wife struggled with the wooden chest in which the family valuables are kept. San Lazaro Hospital was almost burned but a fortunate change in the wind saved it.

As recreation, and partly for the excitement, I have visited several seditious Philippine *Teatros* with Mr Harvey, the attorney general to the Constabulary (with whom we live). The plays are in *Tagalog* but are not hard to understand. The Catapman Society, organized against the Spanish Government is still active against the Americans whom they consider traitors (perhaps not altogether wrongly). It is continually engaged in stirring up the ignorant natives against the Insular Government; and Manila is its headquarters. In one play entitled, *Let the Traitor be Buried Alive,* the events were supposedly enacted between the Filipinos and Spaniards but they introduced an *Americano* who was the most ridiculous character imaginable. In the end the *ladrón* with the national red trousers buried the *Americano* alive, head first, and stamped the ground down hard—just as the Sun of Philippine independence rose in its glory from behind the three sacred mountains and the Aguinaldo march was played. A ban has been placed on such plays by order of Gov Taft.—I enclose the program of another play we visited the next night. This was a strictly first-class performance. The better natives prefer American protection but the *ladrón* element is still strong and it requires constant vigilance on the part of the authorities to head off conspiracies, etc. A general massacre was planned for the 15th of this month but nothing came of

it. I am inclined to think that the whole thing was a "scare." Still, these things help to make life exciting.—I am going out on the bay with Dr McCoy some afternoons this week for my health,—the sea breezes are so healthful, and then I don't care whether the water from Aparri, or the "lemonade" & soda sold in the Tonds market contains the cholera bacillus or not.

Please remember me to your father whom, you will recall, I met in the laboratory last winter. Have you had any new photographs taken? If you have, I would be pleased to think of one coming in this direction—even though it has to make an uncertain journey.

To his mother he reported (June 17, 1903):

. . . We had a typical Philippine rain this morning. Water came down in sheets and ran off the ground in rivers. We had to stop work at the laboratory for about an hour because of it. Our biological department is to move in a few days to a new building on Calle Alex, where we will have more room. —We like our new living quarters at Dr Fale's very much. It is nearer the *Luneta* on the bay front (about a mile), and so I walk there & back every evening. Woolley still prefers to ride.—I heard good news the other day. We are to be relieved of much routine "soon" and our salaries will be raised—probably next October. I believe I am to get $2000, in which case I can easily carry all of John's college expenses.

Better details regarding the new laboratory quarters were sent June 28, 1903:

Moving to-day, and every member, beginning with Jo-Jo, the monkey with the 95% alcohol habit, to the American *Señorita* who guards the books of learning, is happy. Our new, temporary, quarters are a vast improvement. My window overlooks, or more truly overhangs, the street and when I am feeling particularly listless I can watch the tailoresses in the *sastrería,* across the street, or gaze with wonder at the two skinny nags that haul a bouncing car loaded with "googoos" —a part of our wonderful street car system. Or I can look down the street and watch the natives paddling about in an *estero* or, when the tide is high, see them wading knee-deep

in slimy ooze in search of crabs. The new position has many advantages.

TO these accounts of his more private doings, Hektoen, in Chicago, added reference to a more public one. June 22, 1903, he informed Wherry that his "paper concerning the diplococcus from the skin was presented in abstract at the last meeting of the Pathological society." Reporting of the men left in Rush he added: "Dr Ricketts is busily engaged . . . Dr Rosenow has succeeded in cultivating the pneumococcus from the blood in nearly all of a very large number of cases. . . . Yours very sincerely."

Then there followed a P S, written in by hand as mute evidence of what the other men of Hektoen's laboratory had always felt—that here, after all, was the favorite son!

We shall always be glad to present your work to the Path Soc if you choose to send it on.—Dr Jordan and I are to edit a new journal, the Journ of Infectious Diseases, which begins next January. It is an endowed journal and I hope you will favor it with Philip material.—Dear Wherry—we often speak of you and you know you have the best wishes of a large circle of friends here. Ever yours.

The abstract referred to, was published shortly as an article [5] in the United States. It described an inflammation of the skin in a Chinaman which Wherry had found due to a new brand of diplococcus. He followed this quickly with another paper [6], on the effectiveness of a chemical method of sterilizing drinking water. Acetozone proved not to be very good. As these things were under way he wrote me:

. . . The opportunities are good here, will be better, and the salary will probably be higher than I can hope for at home. But, then, it's no place for an unmarried man. . . . By the way, I am going to enclose a P O money order in this letter for $80.00. Will you please pay off the $75.00 I borrowed. The interest, $2.25, was due June 10th, 1903, so I send it and also the next. Did you receive the $53.00 I sent on May 21st? This squares me with the world. . . . Have you started any research in the Pacific Ocean? . . .

To Miss Nast he sent a more interesting account of his activities (July 23, 1903):

My letter-writing is most difficult. I have to write to four different places in the United States and four different places in India. Still, I am always anxious for the incoming mail. I hope you remember the good old text—"it is far better to *give*, than to *git*." Martin wrote from Southern California to-day. . . . he is my best friend—even if I am a "morphologist."

Thus he liked always to twit himself; or to sponsor an opposite point of view. Interested in every new antiseptic, he was himself, all for the employment of aluminium acetate or zinc sulphate; the best intestinal astringent he declared to be the second steeping of tea leaves; and cognizant of the virtues of old-fashioned remedies in general, he rather liked to be called a therapeutic nihilist.

He continued:

What do you think I am working at now? I have been requested to probe the "locust problem!" The locusts are a great pest in these islands often leaving great tracts of land as bare as a desert. They enter even the suburbs of Manila in great swarms. I have seen four such swarms since we came here. They appear literally in *clouds*. It is a great sight to be near and to watch the millions as each flies close behind the other, the whole cloud circling and streaming along. It reminds one of eddies in a river.

The South African locust fungus has been tried here with variable success. I am to determine whether it is of any use at all or if its efficacy can be increased, or if some other way of destroying the locusts can be found. I am not encouraged by the prospects, for so many good workers have spent *years* at this problem and without success. Locusts make such uninteresting patients too. . . .

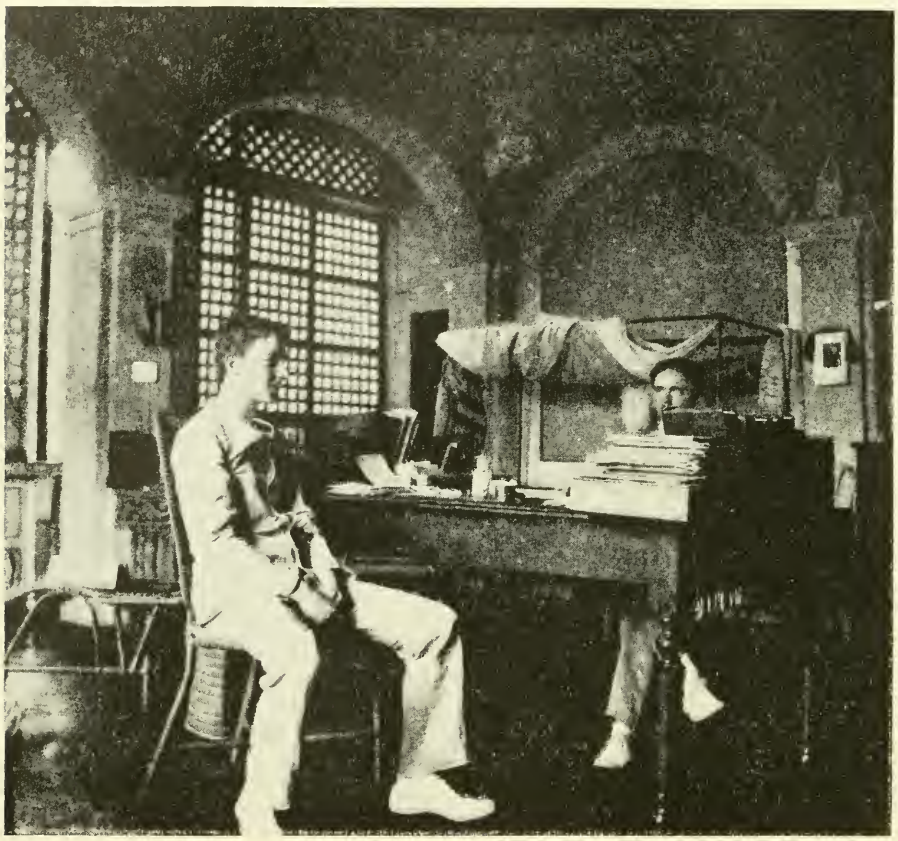
The month had brought him good family news. Not only those in India but the rest, domiciled in the United States between the Missouri and Allegheny rivers, reported themselves well. To which his stanch and favorite sister Lillian, now married to the Reverend Frank McCuskey (her playmate

out of Beloit and now a part of the missionary cause in India) in a letter dated July 29, 1903, and carefully marked by Wherry, "Keep—about Margaret Mc," in early evidence of his lifetime devotion to children, could add:

I suppose since you heard that you are uncle to a new niece you are nearly as proud as we are. Really she is very pretty . . . Such a lot of hair. This will rub off, of course, & then it may come in light, but I think her hair will eventually be black . . . Margaret Elizabeth. Mrs Allison very irreverently calls her "Maggie-Liz" and sometimes "Meg-Liz!" Others call her "Columbia," because she came so near being a 4th of July baby. She sends her Uncle Will a tiny little kiss.

Not so good were a series of medical disasters that had befallen him. First, he had suffered a hand infection, which event he was to convert into a scientific report. Of his tropical fears, the beri-beri had not been realized; but the amœbic dysentery had. Making light of the matter he wrote (August 14, 1903):

I have been staying home for a few days. Some of the festive amœbæ took me for an easy mark and Dr Musgrave has been treating me. I am all right now and will return to the lab next week. One always expects this after a couple of years but I am quite chagrined at falling down in my technique after only six months. I am having a lovely time of it watching the boatmen on the Pasig River or sitting on our beautiful veranda. It is shaded by beautiful betel nut palms and enormous fire trees. The latter were in full bloom last month and the view up and down the street was truly gorgeous—a mass of flame-red flowers resembling our nasturtiums. In the evening the *damedenoche* (lady of the night) emits the most delicious perfume. Why at night only would be an interesting problem to investigate. No doubt there is some pretty legend connected with it.—Sometimes we amuse ourselves by teasing our monkey. We call him Uncinaria duodenalis Dooley. Woolley (the son of the great temperance man) fed him on 40% alcohol in sugar solution until he became a chronic drunk. He would become shockingly inebriated and next day hold his head in both hands in pitifully realistic manner! Woolley must have felt pangs of remorse for he brought him



AT HOME, MANILA. THE HALF-HIDDEN FIGURE IS WOOLLEY

over for a house pet. We have a bamboo pole rigged up, running out from the porch to one of the betel nut palms. Dooley is attached to a sliding chain and feels quite proud of his kingdom. He is a gastronomical pig though. Yesterday he had two bananas and a ball of rice. He grabbed one banana in each hand, the rice ball in one foot and started for the other end of the pole with the sole remaining foot. Only his great presence of mind saved him from inevitable catastrophe. Who says there are no mistakes in nature!

How really serious were his medical difficulties was set forth in a letter to me (October 4, 1903):

. . . I have sent her several pretty presents and she has always been delighted with my "exquisite taste." (I got a lady to pick them for me) . . . I have done little or no work for about two months. I had appendicitis, then amœbic dysentery and now I am having my eyes fixed. I guess I'll have to wear glasses permanently. I think I am over the dysentery O K and am going to take a week's trip to Hongkong. The cooler weather there will put more energy into me. I had a falling out with our "director." I resigned, but as they cannot do without me (big-head) and did not press the matter, I dropped it and have decided to stay my time out. I think I told you they raised me to $2000. I am not saving much though, for it is expensive living here and, of course, I have "family" expenses which I must meet. . . . I gather that I may get something to do in the U S when I return. But then I must *do* something, as so far I have done nothing . . . P S Don't forget to burn this letter.

This criticism of himself was, of course, sheer nonsense. Actually, two articles were already in print and before his Manila experience was to close, ten more were to come from his pen—and of content.

Turning everything to account, he used his own accident as the basis of a report of *Two cases of a peculiar form of hand infection due to an organism resembling the Koch-Weeks bacillus* [*7*]. He had been treating some twenty victims of conjunctivitis and one of osteomyelitis with septicemia when this personal disaster overcame him. The other "case" was that of his nurse who had pricked herself in the finger while operating

upon him. Both had suffered a gangrenous inflammation of the fingers (she with the loss of one) and the severest of constitutional symptoms for weeks. Though primarily a bacteriological report, Wherry sank it in a fine essay on surgery. "How much can be preserved by care and skill, and how much lost of the capital of existence by neglect?" he queried; and sure in instruction, he proposed: "Let the cuts be made too soon and too deep and long, rather than too late." No wonder that the surgeon Senn, after sitting up with him through a night when as medical student he suffered a similar infection, had tried to entice him into the path of surgery! In his clinical notes Wherry stated in typical fashion that his (personally conducted) scheme for treatment had been "haphazard."

Apprised of his illness and commenting humorously upon the state of medicine in the world in general (October 28, 1903) H G Wells wrote Wherry: "It's a toss up: stay here and get pneumonia, phthisis, typhoid and sore; go there and get cholera, plague, dysentery and blue."

Wherry found time to send all kinds of tropical disease specimens to his friends back home. Himself an ardent "collector," he knew what joy these could bring; and so all kinds of microörganisms, microscopic and gross specimens and photographs. Jordan, Wells, Hektoen, Smith, Barker acknowledged their receipt with enthusiasm. To his family he sent less precious pieces of silk, cotton, linen, wood, ivory or tobacco; and of course, to his friends. Not a letter from any member of the family but a thank-you for something. When Manila did not hold what he wanted, Wherry was wont to order father or sister in India to send rugs or brasses. To Miss Nast he sent a bolt of white silk—which three years later she was to convert into a wedding dress. (In 1913 Wherry stood before a tray in Woolley's house, when the two had come to Cincinnati. "That is an unequalled brass out of India's Ambala district," Wherry declared; "there are no more, and won't be, because its workmen have been decimated by the plague." "Yes," Woolley answered, "you gave that to Helen and me when we were married.")

Instead of going to Hongkong to recuperate, Wherry went to Japan. From here he wrote to Miss Nast (now a medical student in Johns Hopkins) as follows (October 20, 1903):

Don't you wish you didn't have to go to school and could travel about "for your health?" It's lots of fun, and much more interesting than hunting bacteria in sewage. I was going to Hongkong for a week. But Dr Freer would not sign a leave of absence for less than thirty days, just as Major Appell (who came over on the *Sheridan* when Woolley and I did) came along and offered to give me transportation to Nagasaki. I owe much of the good time I am having to him.—The railway trip from Nagasaki to Kobe runs along the famous Inland Sea. The country is ideal, with everything—people, houses, trees & mountains—on a miniature scale. Yesterday I visited Prof Kitasato who is stout and serious looking. He did not realize the honor of my visit so I was turned over to an assistant who showed me the buildings. . . . This morning I spent at the great University of Tokyo. I was much pleased with the Medical Dept. Prof Aoyama, pathologist, was most pleasant and courteous. . . . I have seen the geisha dance and have spent all my spare money on curios but as I cannot get a boat until the 10th of Nov I am going to Kyoto and try living in Japanese inns as they are cheaper and I wish the experience. There are such beautiful things to be bought in Japan. "Curio hunters" are as thick as flies and the Japanese are making the curios faster than they can sell them. I saw an old sinner the other day making an image of Buddha "200 years old." . . .

Before Christmas, Wherry was back in Manila. "It cost you a good deal," his father wrote, "but many things are worth more than money." In better sympathy with some other of his financial outlays, he continued: "I hope your effort to pay John's way will not embarrass you." He, too, had gifts to acknowledge. Further, he could report out of the medical experiences in which he was so skilled: "Just to-day I heard of one of our native teachers being poisoned by iodoform causing a serious eruption." Reverting to that earlier request of Wherry, he asked (December 16, 1903): "Did you ever see the Bhili words I sent you for your anthropologist friend? I sent two sets, one in Bhili & the other in Gondi. I should like to hear from your friend as to whether the work was of any use."

At the same time he added:

I have sent to press the MSS of a book on the Mohammedan Controversy, comprising a review & an outline of argument of all who have written in Urdu on the subject. I wonder what language the Philippine Moslems use? Whether they read Arabic & how many do so? Are there any missionaries among them? You may find it difficult to get this information but if you have in reach any government blue book on the census or ethnology of the Philippines, it may be that something is said on that subject. By the way, do you ever visit any of the American missionaries?

Continuing on this more churchly theme, he informed Wherry of the "great meeting in Allahabad when we hope to have a united [Presbyterian] Church for India." In more scientific and sociologic vein he reported:

The plague has left our district but it is gradually on the increase throughout India. By February next it will be rampant as ever. It is a horrid scourge but it is a civilizer. It obliges cleanliness on the pain of death. . . . It looks as if we should have no more rain this year. There has been up to date a fall of 93 inches since January 1st—most of this fell in July & August. And yet in Western India we shall have a famine! Relief works are now being opened to provide work & food for the poor.

Cognizant of Wherry's plans to return to the United States he introduced this note of warning: "You will have to be careful after being away so long lest you get in for something evil from the bad climate of Chicago."

A bit homesick, Wherry sent this letter to Miss Nast on December 20, 1903:

In spite of "strained relations" I have decided to stick it out here. I am not diplomatic enough to get along well in Gov Service, so there is no telling how long I will be allowed to remain. But nothing worries me any more; and taking it all in all, everything is lovely.—You must be thinking of going home for Christmas—I hope you will have a very merry one. I have been very thoughtless this year for as yet I haven't written a single Xmas letter. I always think of these things when it is too late.

Did I ever speak to you of Priscilla Marsh—my little blind

girl? She lives at the Chicago Foundlings' Home with Mrs Shipman, the dearest of old ladies. I used to take her home to River Forest every Christmas Eve. We always had a Christmas tree for my little niece; and my brother-in-law dressed up as Santa Claus for Priscilla's special benefit. You should have seen the light that came into her face when Santa Claus took her upon his knee and allowed her to feel his long beard! That is a treat I shall miss this year; but my sister tells me that she has arranged to have Priscilla out as usual.

Dr Woolley, Mr Clegg and I take turns doing routine clinical work on holidays. They think they have a great joke on me because my turn falls on Xmas and New Year's Day! They tell me, that that is what I get for going to Japan—but of course I don't care.

We have been having wet weather and, following it, a plague of insects. Just now there are more than a million mosquitoes, small flies and beetles around my electric light. I am working up the fleas that occur on rats, mice, etc in Manila in connection with the plague. Woolley says I go bug-house when the brigade marches into the lab with the dead rats. Then, I have been working on some glandered horses just to keep my hand in. We have no guinea pigs so I had to drop the work on cholera. The weather is perfectly delightful. I don't see how you can stand the dreadful cold you must be having. I believe I can never learn to bear it again.

Yes, my recollections of Japan are already becoming hazy and sometimes I wonder whether I really went to that country or if I just dreamed of that visit to fairyland. I want to go back someday, not to see the wonderful temples at Nikko or Nara nor the great *Daibutsu* at Kamakura nor even to worship at the base of Fujiyama, the sacred mountain; but to see the babies. If I were a girl, I would play with a Japanese doll for it represents the best child in the world.

Thank you very very much for the *Life of Pasteur* by Vallery-Radot. I had been wishing for it ever since it came out.

IN Manila a new serum laboratory was being opened. There was no question, of course, of who by priority, training and experience should be its "director." The place, besides, carried

a better salary and that was important; yet what he did in the matter was again the eternally Wherryesque. There would be too much bookkeeping in the job and his scientific work would suffer, he said; and, anyway, Woolley had tired of his pathologist berth and craved this novelty. So he got it.

W E Musgrave was moved into Woolley's place. This figure had entered the Manila picture from the United States some six months earlier. He had come out of George Washington university with a medical degree only the year before but had had long experience earlier as a technician in the old Hygienic laboratory in Washington. In fact it was via the aid given him by his medical superiors here, that he had been freed from his routine and sent into medical school. At the time of his appointment to Manila, Musgrave was thirty-three, and unheard of. His subsequent distinctions were to be many, but he used to blame their start upon Wherry, whose "discovery" of Musgrave was to be publicized within the year though the story of it is here delayed. At the moment the two with Woolley had pooled their house-keeping interests and moved into a common domicile.

January 23, 1904, Wherry gave this account of himself:

I refused the directorship of the serum institute at three thousand last month, for all one's time is taken up with red tape in such a position. . . . For several weeks I have done nothing but work on my cholera cultures.

A week later he added:

I must thank you again for the *Life of Pasteur*. I have not read the last chapter, for I wish to read the story over again before I come to his death. I like to think of him as still living.

Hektoen inspirited him with a letter (February 7, 1904) not without historic interest in its reference to matters medical in Chicago:

. . . We hope you will like the Journal of Infectious Diseases; also that the express bill for the reprints will not throw you into involuntary insolvency. The second number is now under way. We have in it an article by Rosenow (on pneumonia) that I think you will find interesting. Articles from Manila will always be acceptable, of course, and we hope that as you

and others out there make startling discoveries our journal may prove an acceptable medium. . . . By this time Dr Herzog has probably reached Manila and I hope you will find him an agreeable and valuable addition to your circle of investigators. A suggestion now and then that he confine himself to the lower strata of the atmosphere will surely prove helpful on account of his tendency to soar in the upper heights where it is only by means of imagination that one feels solid ground below. Indeed, I often think that in a certain way the reputation of Chicago pathology in Manila now rests upon you and the others that have gone there from here. You may be pleased to know that all your friends have the utmost confidence in you and that you would have to do something quite peculiar in order to shake that faith in your scientific rectitude and high purpose. . . .

As Wherry's months in Manila had multiplied, his accounts of them to Miss Nast did also. In addition, his letters became more personal. February 8, 1904, he wrote:

If I could only make you see my dear mother and father pinching themselves in order to educate our large family! You would then see why I must stay out here where I can get better pay than at home. I have decided to give my brother John a start into agricultural college, for he is determined to be a rancher.

Such confidences led to an understanding between them. At any rate, in response to a letter from me of purely scientific content, Wherry wrote (February 20, 1904): "What do I care about sodium or calcium ions; toxines or antitoxines! She blames *you* for it all. I hope that you will be rewarded in Heaven!"

To Miss Nast's request that he tell her something of his family, he responded at length. Its main points have been disclosed, wherefore only the following excerpt from his answer is quoted (May 3, 1904):

If I am to tell you about my family I should have started last week, for we are nine in number. . . . The natives worship my father. When he returned this last time, he visited some villages near Ludhiana and was shocked to find one of his pho-

tos, presented ten years before, stuck up in a niche among their gods. . . . How can one describe the virtues of a mother? My blackhaired sister, Grace, is a musician and the business head of the family, living in our home at River Forest. Next comes my sister Lillian, who is the beauty, the songstress and the favorite. She fell in love with a Mr McCuskey, who took her to India as a missionary. I haven't forgiven him for that. . . .

On the John situation, this sister Grace had just reported: "Yes, you have sent money enough. I have some of papa's too, but as he was in debt & the house just had to be fixed & painted & interest & taxes & all & John's clothes, everything . . . this year has been a fright. . . ." A letter from the father (July 11, 1904) brought evidence that he had gone through the catalogues of various American agricultural colleges and had softened somewhat in his insistence upon the purely classical in higher education:

The course is almost equivalent to that of the ordinary college. It is scientific rather than classical, though modern languages are included. I think he had better be allowed what he has set his heart upon. Tell me how you will be fixed financially when you go home. We are about $300/ in debt on account of numerous weddings, etc! but we shall be clear by April next.

The happy outcome of John's serio-comic was thus heralded by him (August 4, 1904) after a year in Washington and Jefferson college:

It's the University of Illinois that I'll go to, Bill, and I hope that one year there will be sufficient as I not only want to get started farming but this school business is a great expense and a whole lot of it, waste time. . . . I want to quit monkeying with algebra, geometry and library science and take agronomy, animal husbandry, some parts of horticulture, a little veterinary science, soil culture and irrigation. Also, I'll try to make it less at Champaign than at W and J and I'm sure it will be.

With warm thanks to Wherry for what he was doing, he added a postscript: "Your fame has reached this country, Bill. A doctor here reported that Wherry of Manila had discovered

a new germ. I also heard it. Good boy! Keep it up and good luck to you!"

Wherry's own letter of June 8, 1904, was franker than usual in tone:

Thank you for the abstract. I have not kept up with the literature on Ehrlich's theory. In fact, I don't believe it worth while. If his theory should stand, which I don't believe, then I will have to get down to work.—You will be surprised when I tell you that I have dropped cholera. A good many of the guinea pigs I was using had been immunized against cholera in Japan and as it is like pulling teeth to get animals through my "director" (and he has ruled that all animals shall be ordered thus), I decided to quit until we moved and our own animals were old enough for use.—I have an interesting little Japanese girl under observation, a case of Dr McDill. O'Saya has an infection of the bladder. I am trying to determine whether it is a chyluria due to ordinary filariasis or not, and am inclined to think that we have a new species in hand. The director is very sore—no other word can express the feeling which he shows—because Dr McDill did not see him about the patient in the first place, and more sore because I did not hunt him up on his return from Benguet and show him the parasite. He's such a baby. Well, here I am talking about my superiors again!—Woolley and I are working up some cases of contagious pemphigus, so you see we have our hands full.

This reaction to his "superiors" was to exhibit itself as the continuing irk of his life whenever men and things stood in the way of the rapid accomplishment of what Wherry deemed the day's labor. The "interesting little Japanese girl" was to become the subject of two important scientific papers. The conjunction of Woolley's name with his own in the work on contagious pemphigus (also to yield a scientific report) while never realized was early example, nevertheless, of his eternal generosity. It was Wherry's habit always to drag the name of anyone standing about the laboratory upon the title page of the scientific article he was producing at the time; except, of course, in those instances in which he handed his "collaborator" the whole business.

June 14, 1904, he noted that he had so much work on hand

that he knew not what to do. "The latest is a bacteriological examination of soil from the Island of Mindanao. They want to know whether nitrifying organisms are present. So far as I am concerned, I don't care." But July 24, 1904, he was in better mood:

> I finished up an article on the biology of cholera but am holding it, because of some experiments which I want to repeat. It may amuse you to hear that Dr Freer told me confidentially that he considered it the most important article put out from (he should have said *of*) the Bureau, because I have attempted to explain some things from a semichemical standpoint. If you knew the limits of my chemical knowledge, you would appreciate the joke as much as I do myself. But Dr Freer is an awful flatterer.

In fact, Freer was nothing of the kind. His compliment referred to observations made by Wherry on the growth characteristics of the cholera spirillum which though dated August 1904 in the director's letter of transmittal, and October 1904 in the bureau's bulletin file, were not to come out in printed form until 1905 [9].

To recognize the importance of this paper one must recede to the bacteriological gospel of the day. It was still the time when microörganisms were considered fixed entities—that is to say, life forms which in shape, size, manner of growth and chemical reactivity did not vary. In this paper Wherry brought proof that for the germ of cholera none of these things was true. Thus in the descendants bred from a single microörganism he noted wide and "spontaneous" variations in size and shape even when cultivated by "standard" laboratory methods. The "cause" for this needed to be hunted out. In this quest he found that the stiffness of the culture ground, its degree of acidity or alkalinity, its content of salts, etc had everything to do with what finally emerged. The environment, in other words, exerted a marked and modifying influence upon the "biology" of the organism. Hereafter the conditions surrounding its development had to be considered along with the heritage.

In the terms of scientific philosophy Wherry had arrived!

BUT even as Freer was thus manifesting in his own person the benefit of sound college training—the ability "to know the first-rate man when he saw him" (to quote William James)—Wherry was at identical business. "The most interesting and valuable article of the year will be by Dr Musgrave," he had written to Hektoen and Miss Nast. To the latter he had divulged: "By the way, I found filaria last night in the blood of my little Japanese girl. I was glad to find them but I am awfully sorry for her, for it increases the gravity of the prognosis. Poor little O'Saya! If I can only locate the adult worms, maybe Dr McDill can help her by an operation."

August 4, 1904, he wrote:

I am still interested in my filariasis case and last Saturday stayed up all night and took blood specimens every two hours in order to estimate the relative number of filaria present during the day and night. (Of course, this has all been done before but I wanted to see for myself.) It is a case of filaria nocturna. We are trying to stop the hematochyluria with rest, diet and suprarenin but, so far, without much success.—Manila would be an unbearable place to me if there were not so many interesting diseases here. Since coming I have seen dengue, plague, cholera, beri-beri, leprosy, glanders, filariasis, trypanosomiasis, malaria, yaws, amœbic and bacillary dysentery, a number of skin diseases and various animal parasites. Of course, I don't know much about some of these states but I have had autopsies on many and have worked up some of them bacteriologically and pathologically. However, as Jimmie McFadden says: "What's the use?" All this can lead to is a professorship someplace, where it is colder than ice. But Dr Freer, who has taken an interest in my work, says that I may come back here and that he will see to it that I have a better position than the one I now occupy.

This letter makes casual mention of another capacity in medicine of which Wherry had supreme command—that of macroscopic and microscopic autopsy. September 1, 1904, he wrote as follows regarding his filariasis patient, another of the day's experiences shortly to find its way into print:

I have been very busy following up my cases. Little O'Saya is in fine physical condition but we have not yet succeeded in

stopping her chyluria. I am now hunting for a dog with filariasis. We intend to saturate him with quinine and then expose him to *x*-rays. I got the idea from Musgrave and it seems as though we might have some success by such procedure. But, of course, we must test it upon some lower animal first. Then I have been working nights trying for a photo of the filaria. A good picture has never been published. After many attempts the government photographer, Mr Martin, succeeded in getting one for me of about 390 diameters. This has taken much time, as it is over two miles to the hospital. Just now our work is greatly interfered with, for we have moved into the new building which is in a very unfinished condition and it is impossible to do anything with carpenters, plumbers, etc working about.

An earlier letter to me (August 6, 1904) was devoted entirely to W E Musgrave's discoveries. In May he had sent a similar epistle to Hektoen and in July (as we have seen) to Miss Nast. Here he was again dinning into a receptive ear the importance of another fellow's accomplishment:

I have had something on my mind that has been worrying me. The most important work that has been done out here has been carried on by Dr Musgrave who has succeeded in cultivating a single species of amœba in pure culture with one species of bacterium. A number of pathogenic and nonpathogenic bacteria serve as food supply for the amœbæ, and with such "pure mixed cultures" Musgrave has established the etiological rôle played by these protozoa in amœbic dysentery. His work will be published before long. Now it seems to me that Musgrave's work opens up the way to important investigations in physiology. A sufficient and constant supply of such unicellular organisms has never before been available and now all you have to do is to cultivate them as you would so many bacteria. . . . I thought of working on the factors influencing their streaming or their movement but I simply cannot find the time. . . . With Musgrave's consent I am sending you three cultures on agar slants. . . . The agar medium is made as follows . . .

After four pages of instruction and suggestion, Wherry ended:

Whatever you do, don't infect yourself! In young cultures you will find the amœbæ motile; in old ones, most of them are in various stages of encystment. These keep their vitality for months without transplantation.

When the cultures arrived, I had resigned my university place and entered private practice, on which account Wherry's enthralling suggestions to me came to naught. Later (1914) he himself returned to the subject. October 1, 1904, Wherry wrote as follows:

I returned [from Culion] last week. We had a nice ten-day trip on the *Balabac,* a coast guard steamer. Our party consisted of Mr Wooster, secretary of the interior or the czar of the Philippines, Major Carter, commissioner of Public Health, Mr McCaskey, chief of the Mining Bureau, Mr Miller, a U of California man and one of Fischer's friends who is acting chief of the Ethnological survey, and myself. Major Carter was sick with malaria. The rest of us had a good time. The Calamianes Islands are beautiful. Culion, Coron, and Busuanga are the larger ones and these are surrounded by thousands of smaller ones and by rocks and coral reefs. We spent most of the time at Culion. There was nothing doing in the line of cattle diseases so I had little to do. I examined quite a number of people for malaria with negative results but found amœbæ in the drinking water. The leper colony is to be on a point which runs into the Bay, a beautiful spot. Dr De Mey, the superintendent, has done much to improve the place. The Government has bought up all titled land and removed the inhabitants except for some aborigines, Tagbanua, whom they can't catch. Game abounds on the island—wild carabao, deer, hogs and birds. I would like to spend a vacation there. I had to go around the island to the stock farm at Halsey Harbor. A typhoon was blowing and we had to run in the trough of the waves; and I got sick! [Wherry was a born sailor.] On the way home we harbored on the northeast coast of Busuanga. We found a nice coral beach and I went swimming with the intention of getting some coral. One dive was enough! I was alone, and when I got down among the slime, polyps and hydromedusæ, I couldn't get back to the surface soon enough. So I went ashore and tried to buy a baby from one of the

aboriginal women for a peseta [ten cents] but was unsuccessful. Altogether it was a nice little vacation.

We are getting settled in our new building and if the earthquakes let us alone, the quarters will be very favorable. Of course, some of us think that the plans are not what they should be, but that is always the case. Dr Freer is a great man and if it were not for his influence, I am afraid that science would fare sadly out here. He was badly burned the other day by the explosion of a bottle of formic acid but he hustles about the same as ever, hurrying up the workmen and seeing that we get settled before he leaves for his vacation in the States. As Musgrave says, "He's as full of ideas as a tick."—Last night we tried the *x*-rays on O'Saya who had received about eighty grains of quinine during the last few days. The *x*-rays alone were a failure. I am sorry to say that she is getting quite blue over our inability to cure her. She always says "my" for "I." A lady missionary has been calling on her and giving her lectures on things she cannot understand. The other day O'Saya got tired of it and said: "My no guess Jesus gentle shepherd. My want to make a die quick." I am afraid she will commit suicide sooner or later, as so many of these patients do. If we fail on the quinine and *x*-rays, we will let her go back to Japan, for her relatives are getting tired of paying her hospital bills. There really ought to be some place out here where such patients could be cared for, free of charge.

October 14, 1904, Wherry could report:

. . . Forty-eight hours after our *x*-ray and quinine treatment, the little girl developed a high temperature and pains inside. Pleurisy set in and Dr McDill aspirated her left chest. She is still peculiarly feverish but her temperature is not much above 102° when up, and she appears quite well. What tickles O'Saya is that about the time of the pleurisy, her chyluria disappeared and so far has not returned. What I hope is that the pleurisy was the result of the death and disintegration of the adult parasites but I cannot tell yet, for the embryos are still alive in her circulation. Dr McDill and I have been having a fight over O'Saya's stay in the hospital with the authorities and the secretary of the interior. I will let you know how we come out.

HIS observations on "little O'Saya" (stripped of their spiritual backgrounds) went to press under the title of *Notes on a case of hæmatochyluria* [*10*]. As clinical report, it added merely to the knowledge of the geographic distribution of filariasis. Charles Martin's pictures (photographer of the Manila laboratory) gave the scientific public a better view of the matter. More important for the philosophy of parasitology were Wherry's comments. O'Saya had lived for several years in immediate contact with three Japanese women in an atmosphere perpetually infested with *culex* mosquitoes. It was general opinion that the disease was transmitted of their bite, yet O'Saya had sickened none of her neighbors. In the face of this evidence might we not have to revert to Manson's original view, Wherry asked, and think of the worms escaping from their mosquito homes to some watery medium, later consumed by man with his food? Again, no filaria-struck patient had ever been cured. Wherry and McDill had tried to accomplish it by repeated exposure to the *x*-ray after sensitization of the filaria to its light by large doses of quinine. In this report and in its American reprint [*10*], the patient's symptoms were described as so improved that from being bedfast, she was walking again. But living embryos were still present in the blood. Wherefore Wherry wrote: "It is altogether likely that the treatment had no effect upon the adult parasites." But it had. January 29, 1907, McDill confided to Wherry in a letter: "I have had O'Saya's blood examined on two occasions, the last, one month ago, & she seems free of parasites." As published supplement [*29*] this fact closed the story.

As 1904 neared its end, the elder Wherry reported out of India on young Wherry's mounting scientific recognition:

. . . I gave our Civil Surgeon, Capt R Heard, brother of Dr Lyon Heard of Dublin, a reading of your pamphlets. He was so much interested that he asked the privilege of keeping them. Your investigations as to the Pasteur filters are very practical here & he wishes to investigate somewhat on his own account. Dr Heard has a very high esteem for American study in medical science—indeed he does not hesitate to say that we are far in advance of Britain & Europe.—As to your plan to visit us on your way home, if that means that you forfeit a free passage, I am doubtful as to the wisdom of it. . . .

More satisfying to his soul were perhaps the more distinctly family reports. John was doing well in Illinois. From Ludhiana, his mother wrote (December 7, 1904):

Those collars and cuffs you sent me are lovely. Nellie's, too, have come and she is delighted. She will let Aunt Sarah have the handkerchiefs. . . . I went into camp [meaning a camp-meeting trip] with Miss Morris and your Aunt Sarah [over sixty]. We were out 2 weeks and visited 17 villages. Miss M spoke in one 4 times, in others 3 times & so on. I don't know Panjabi so she had to do all the talking. I could help her sing, as I can read it from the book. I just went as a companion as she could not go alone. Your aunt & Miss Jenks had gone in another direction. Of course curiosity was at the bottom of it. . . . We gave away a good many tracts & portions of the Scriptures. We didn't see *one* woman who could read & very few men. We gave to everyone who could show that he could read. . . .

Your papa came out to Jagroon one day in a dák gárí 24 ms, got some chhota hozárí & then took another dák gárí & drove 18 ms, then in an oxcart 10 ms over kaeha roads—all in one day to Dharmkote where a Christian Pandit lives who was anxious to have your papa visit him. He stayed there one day, slept 2 nights or parts of nights in a Hindu house and ate native food that the Pandit fed him. He got up at 3 o'ck one morning, drove in an oxcart 11 ms to a place where he got an ekka in which he rode 11 ms to Jagroon. After eating breakfast we drove to Ludhiana 24 ms in a dák gárí. The consequence was that your papa was very ill all night with diarrhœa. . . .

Hektoen wrote him by hand—it was his custom whenever really interested in the content of one of his letters or its recipient—December 17, 1904: "Your photograph of filaria in blood looks like a bird's-eye view of a winding river surrounded by clumps of trees." After some general advice to the Manila workers that they shorten their contributions to his newly established *Journal of infectious diseases,* he continued:

I hope that our editing will not make any of these gentlemen our enemies for life. Let them lay stress upon our intentions

more than on our actual performance. Right here let me suggest that I shall always be glad to have interesting things like the amœba cultures presented (by some of your friends here) to the Chicago Pathological Society which still flourishes as of yore. . . . Dr Ricketts is gaining heavily in importance since his good qualities have become known. . . . We seem all to be "sawing wood" which in many cases may mean merely this, that there is no very great activity of any kind. Money, money, money is the great, crying, everlasting need it seems. Yet much could be said on other phases of the requirements for progress. Perhaps great progress is going on right under our noses [it was!] without being perceived on account of its relative slowness. Well, now I have chatted with you without restraint about things of various kind. The main burden of my song, however, is this, that I wish you to know you have good friends here who are watching closely for all developments in the "far east" in which it is likely that you may have a hand. . . . Also, remember me to Dr McDill whose reputation for good work and heavy charges is rapidly spreading over the civilized parts of the globe. . . . Did I tell you that we have a youngster who arrived about a month ago and to-day weighs 10 lbs and 5 ounces (of course you do not know what that means to fond parents for whom every unwonted wrinkle in the skin means general marasmus and inanition)!

A letter from his aunt Sarah (December 27, 1904) thanked Wherry for Christmas gifts and reported a visit to Allahabad where she had gone "to see the General Assembly organized and especially the union of several Presbyterian denominations. It was a grand meeting. Your father was a happy man as he has been working for this for years." Reverting to her own interests, she wrote: "I have wanted monthly meetings for the strengthening of the village workers for a long time. I do hope that they will be greatly helped and many more souls brought out of darkness into light in consequence."

The father confirmed the aunt's news (December 28, 1904) of the union of eight Presbyterian churches, with another due the next year, into "the Presbyterian Church of India." "This is a real Indian Church," he continued, "having

no connection with the churches in Europe or America except that missionaries may belong to either or to both." Expressing his pleasure over the meeting of Wherry with several of the missionaries of the Philippines, he advised: "The only regenerate Philippine Government will be a Protestant Government. Romanism has failed everywhere as a civilizer." For the rest, there was still some fatherly advice to be given the son:

You are quite right to devote yourself solely to your professional duties. Social life can be relegated to a time when circumstances will justify the luxury. You are also right in denying yourself the ephemeral notoriety which affected brilliance of research brings to some young men. It is better to do one thing well than a hundred indifferently. The former will endure.

WHEN 1905 opened, though committed to the design for early departure from Manila, Wherry was still in doubt as to whether finances would permit him to travel westward; and still at work scientifically. January 17, 1905, he wrote:

I have been working on a case of fever which did not resemble typhoid clinically and yet would have been diagnosed such by ordinary laboratory methods. Thirteen cultures of the patient's blood yielded bacilli which resembled typhoid excepting that they produced indol. The work is not completed but I *think* this organism will form a connecting link between the typhoids and the paratyphoids. In connection with this study and in confirmation of some work I did with the cholera spirillum, I am investigating the influence which nitrates exert on indol production. The bulletin on the cholera spirillum was finished last August but I don't think you will see it for some time, as my chief is getting even with me by delaying its issue.

The last item has been referred to. The Bureau had been better pleased to bring out a more typical kind of government report, entitled, *Glanders: its diagnosis and prevention* [8].

Nothing but its good exposition could have saved this paper from the fate of all such stock issues. A subtitle under the main heading and some excursive pages helped further. In these Wherry reported "on two cases of human glanders occurring in Manila and some notes on the bacteriology and polymorphism of *Bacterium mallei.*" The facts brought forth under the first half of the subtitle made surer the ground upon which epidemiologists walked; those under the second, less sure the foundations of species fixity. Again, as in the instance of the cholera spirillum, it depended upon the nature of the environment as to what form the glanders microörganism would assume. As the culture medium was made more acid, or contained a lower or higher concentration of common salt, the "regular, very minute rods" ordinarily characteristic, became "irregular, curved and sinuous" or "irregular, branched, clubbed and vacuolated."

January brought Wherry an invitation to head the serum institute newly established in Siam. In February he had not yet declined, believing that he might use it as a stepping stone in his return to the United States via India. Wherefore he wrote as follows:

The physician-in-chief to the King of Siam, visited this place some time ago and looked into our vaccine and serum work. He has started such work in Bangkok, but has met with unexpected difficulties. He begged Dr Freer to send him someone who could help him out. There is no one here who can go, so I told Dr Strong that I would be willing to stop off (on my way home) for a month or six weeks if they would pay my way to Bangkok. I had just about given up the idea of returning via India but if this scheme works out, I can make it.

By the end of the month the scheme had not worked out but he had determined upon the India tour nevertheless. He wrote:

What I have decided to do is to stay here a month longer, catch a *Norddeutscher Lloyd* liner at Hongkong, get off at Colombo, go over to Madras, and thence by Bombay to Karachi and up along the Indus River to Lahore and Ludhiana; then back to Colombo, a round trip of about 5000 miles in

the hottest season in India. As I know from experience, it will be one perpetual Turkish bath but I feel as though I ought to undergo the treatment. I hope you will be prepared to see some changes in me. Woolley says he has never seen anyone change so much in two years and insists that it is for the worse. I admit it; and tell him that it is because I have lived so long with him. . . .

On the rumor that I was about to become a member of the Manila enterprise, Wherry commented: ". . . It would be very provoking to have Martin come out here just as I return, for someday we are going to work together in the same laboratory." He wrote me directly:

. . . I would be glad to figure on returning here if it were not for some of the officials whom I cannot or will not stand. I wish that I could get back to the University of Chicago, although I don't believe I can stand that climate any more. My mitral stenosis has been bothering me lately and my peripheral circulation is a peach. I mailed you one of my bulletins a couple of days ago and trust that it won't make you sick. I will be gone from here in a few weeks.

In the last notes that he wrote from the Philippines (March 12 and April 1, 1905) he stated:

This is the slowest month I ever spent in Manila. I am ready to leave but cannot until the sixth of April.—Dr Lewis, our physical chemist, and I bought a python, about ten feet long, the other day. He was to have the skin and I, whatever I could find inside of it. It was a profitable investment, for I extracted a large bunch of intestinal parasites. The authorities are pumping sand from the bay into the old city moat and so have driven several interesting serpents from their haunts. Don't you wish you lived in such a stirring locality!—On the fifteenth of March a rat full of polar staining bacilli was turned over to me and as no one has really proved the existence of plague in rats in Manila, I got busy with the examination. It was really a plague rat but I am not quite through with the work, for during the study of five cultures, I stumbled onto an easy method of staining the defensive capsules of some bacteria. Prolonged staining with Wright's

modification of the Romanovsky, colors the bacterial cell nucleus blue, while the capsular substance found on agar cultures of B-pestis and B-bovisepticus takes the eosin. I have had some photomicrographs taken showing the stained capsules which you will like to see.

The story of this rat made an article [*12*] entitled *The bacteriological examination of a plague rat* the following November. Here he said that he was out of patience with the "rough and ready" methods generally employed for the diagnosis of the disease and wished to prove scientifically that Manila plague was really plague. "One grows tired of reading of the occurrence of plague in pigs, dogs, jackals, snakes, etc, without the presentation of sufficient evidence." Whereafter his account brought the proof in anatomical and bacteriological form—in excellent example to less experienced workers of how to do such things. But Wherry got quickly from this to a discussion of more abstract notions of infection. He had found a new method for staining the capsules about bacteria, and noted that his pest organism showed none as taken from the body, but developed them soon after it had been made to grow on artificial media. This raised anew a question of Theobald Smith: Is capsule production a method of defense against an unfriendly surrounding? Smith had written: "The formation of protective or defensive coverings . . . would account for certain phenomena, which are familiar to bacteriologists, much better than the current theory which bases parasitism exclusively upon toxine production, active or passive. In cultures we should expect a loss of power to form protective substances . . . " In the specific instance of plague, Wherry's findings said the contrary. Whereafter he gave evidence of the broad fashion in which he always looked upon disease from a natural history point of view. The capsule formation had to do with the universal battle in all infection between host and attacker. And now he asked about the rats which harbored the fleas that transmitted the plague. He wanted to know what *kinds* of rats were chiefly to blame. On this subject he reported some three years later. At the moment he displayed for view a dramatic biological set-up. "Bruce Skinner has presented evidence

which seems to point to the complete or partial immunity of the Norway rat (*M decumanus*) to naturally acquired plague, and has suggested that through its successful antagonism to the long-tailed rat (*M rattus*), it has played an important part in preventing the spread of plague in Europe and elsewhere."

IV

WHERRY'S days in Manila, thus protracted into April, allowed him to receive some home mail. Sister Grace, out of Chicago, informed him: "I have kept account of all the money you have sent." Whereafter she admonished: "Don't bring me anything . . . we have to save." John asked from Champaign: "Have you some fond heart in Manila, or among the heathen, or in Chicago?" Wherry might have answered that his hopes lay in Baltimore and Cincinnati; but did not. His father wrote him about a diphtheria-like disease that had broken out in Ludhiana and transmitted articles on sleeping sickness in the Congo and East India's work against rabies. Late in January, Wherry's mother could still write: "I often think how nice it would be if we should hear that you were coming to India. Yet, again, I think what a lot of money it would cost." Reporting on things present, she continued:

Nellie, Lillie & Margaret are invited to the Rajah's to a birthday party. They are to be his guests for four days in the palace. The party is on the occasion of their baby's first birthday. He is a young man with 2 Hindu wives and one English. She is the daughter of a barber and her mother was a rope walker. It is her baby's birthday. They poisoned her first child, though it never could have been the heir according to English law. It is feared this one will meet with the same fate. I am rather afraid for the girls to go but they are anxious to see the sights.

To a letter of the father (February 1, 1905) she added a postscript of many admonitions as to how to avoid the plague. Also, he was not to travel 3d class in India, to stand in the sun, or to tip unreasonably, above all, not before his baggage had been placed where he wanted it.

Thus forewarned, he set sail westward on the *Siberia* on April 8, having left unpaid the annual assessment of one dollar (U S gold) for membership in the Society of American Bac-

teriologists (the only national scientific society which was to honor him by election, or to which he was to remain attached afterwards). From "somewhere in the China Sea" he wrote:

We left Manila Bay yesterday morning and reach Hongkong to-morrow. On the twelfth I take the *Prinz Heinrich*. I'll be very glad to reach Colombo, where I can telegraph my mother and father, for I feel anxious lest they should have been injured in the severe earthquakes they had in nothern India last week. —I have been a chronic kicker in the laboratory as you have no doubt surmised from my letters. And to be consistent, I have always refused to attend any social functions given by it. But on the fifth, the surprise of my life was sprung. It had been announced that Wooster wished the laboratory staff to assemble in the library to hear something important. I don't love The Honorable, but deciding to be decent for once, I assembled myself upstairs where the crowd was waiting for The Secretary of the Interior, and sat down and crossed my legs and looked bored. Then Dr Strong announced that Wooster had been called away unexpectedly and proceeded to say a lot of embarrassing things about me and presented me with a gold watch from my fellow workers. I was so overwhelmed I could only say a few disconnected sentences in reply. You can imagine how proud I am of that watch!

He next wrote from aboard the *Prinz Heinrich* in its ten-day journey to Colombo. The following are excerpts from his journal-like letter:

April 13, 1905: I can sympathize with that Evil One when he rose dazed after his fall from the Realms of Bliss. I had such a good time in Hongkong; and third class on the *North German Lloyd* is so extremely rotten. In Hongkong, Dr Koch kept me on the go. He is municipal physician and I accompanied him on his rounds to the Jail, the Civil hospital, and the Small-pox isolation hospital which is on a houseboat in the harbor off Kennidy town. There is little research going on but their routine board of health work is well systematized—as it is bound to be in a Service like the Colonial in which the appointments are *ad vitam aut culpam*. Plague has apparently died out though they occasionally get an imported case. All their smallpox cases were imported.—Dr Koch showed me slides

from three cases of relapsing fever and of infection with *Distomum ringeri.* Scheube says that relapsing fever is probably endemic in Hongkong but there it is considered a rare affection and the physicians were greatly interested in these cases which were imported from North China. Seven days after the recovery of the last case, one of their office boys developed the disease.—Hongkong is the only really European city I have seen in the Orient. The English make it a point to enjoy life. Dr Koch has a beautiful home, part way up the "peak," and his wife and step-daughter, who are French-English from Louisiana, put themselves out to entertain me. His stepdaughter, Miss Blair, took part in a play, "One Summer's Day," given by their Amateur Dramatic Club, so we went to the last performance. It was very good and I enjoyed myself immensely even if I did go in borrowed clothes. —We are moving along at fifteen knots an hour towards Singapore. There are a lot of Russian emigrants and Port Arthur refugees aboard and they are the original human pigs. I sleep on deck hereafter. My cabin mates are two bushy Russians and a lanky Dutchman who has T B. Of course I pity the poor fellow but draw the line at sleeping in a 6 x 5 cabin with him.

April 14, 1905: I don't know whether it is a sign of the great ease with which we revert to a lower type, but somehow my surroundings do not seem so bad to-day.

April 22, 1905, Bay of Bengal: I intended to write every day but have not felt up to it in these surroundings. Some of the people are interesting "specimens," and I often wish I had brought a roll of films for my camera. There is one old Russian refugee on board whom I wish you could see. He is big, fat & dirty, with a large and straggly bunch of Ivanovich whiskers; and night or day he is to be seen clothed in the simplicity of a pink Japanese kimono with large blue floral decorations! Even the sailors smile when he passes by. . . .

We stopped for about eighteen hours at Singapore which is really beautiful. The Government Botanical Gardens, the tropical residences and one's first experience with the real Malay are all worthwhile.—I called on Dr Dindlayson, the Govt bacteriologist, but made a very short stay as he was away until almost time for the boat to leave. He proved delightful.

The Government has started a research institute eight miles out but I had no time to visit it. Then we stopped at Penang —farther up the Coast. It is a dirty hole and sleeping on deck while tin and tobacco are being loaded does not add to the pleasure of a stop. . . .

April 23, 1905, Colombo: I telegraphed north this morning but will not receive an answer until to-morrow. I felt quite blue to-day although I know it is unphilosophical to worry. My father said that there would be mail for me here but as there was none, I am afraid that something may have happened. I don't like Colombo and will be glad to get away.

The overland trip to Madras was described in a letter dated April 26, 1905:

I left Colombo on the evening of the twenty-fourth as no reply to my telegram had come and I did not feel like waiting any longer. I have found out since that it is not hard to beat a telegram by rail in India. I am going to telegraph again from here and have the answer sent to Bombay. From all I can learn though, it is probable that my anxiety is groundless as very few Europeans in the Panjab were injured. The night trip from Colombo to Kola was quite pleasant. Then the rail trip of a day and a night brought me to Madras. The heat, the thousand begging natives who wish to assist one at every turn, and the numerous maimed and blind whom one wishes to help but must pass by for financial reasons, all conspire to make the trip unpleasant and never to be forgotten. Frankly, I don't like southern India. There is not much to be seen at Madras and I am getting out as soon as possible—at 6: 45 this afternoon. Two and a half days and I will be in Bombay. I look at every drink of "soda" with suspicion. One can travel so much more comfortably if not a bacteriologist.

His letter of April 29, 1905, said:

Here I am on one of the coast steamers, the British India S S *Dumra,* on the way from Bombay to Karachi. We arrive there to-morrow morning and in another forty-eight hours I should be at Ludhiana. I just made the connection at Bombay. One of the medical inspectors at the dock—Dr Graham-Stewart—said that they were having about 10,000 deaths

from plague per week. I didn't stop as I expect to spend a week in Bombay on the way back and am anxious to reach Ludhiana. The trip from Madras to Bombay was a hot one. The journey is across the barren plain of the Decca plateau and the winds scorch. It was 102–104 in the shade. I bought a *sola-tope* (sun hat) in Madras and packed my Manila hat. With this and the judicious use of a few Hindoostani sentences, travelling has been more comfortable. I am not bothered so much by guides and beggars as I was. One would like to give them something—blind, maimed and lepers, old men, women, and children in scores—but it would take a fortune. Happily the natives themselves are charitable.—I have stopped *planning* for I find I am no good at it. I telegraphed to Ludhiana from Madras and asked them to answer to Bombay. When I reached Bombay I had to choose between waiting two days for the answer and another boat; or taking this one.

He described his meeting with the Indian division of his family—he had not seen them in more than ten years—in a letter out of Ludhiana (May 4, 1905):

How can I express the concentrated joy of the last two days? My father and mother were so glad to see me; and I was so glad to see them! Then my sister Lillian with Mr McCuskey and my little niece Margaret came up on the first train from Umballa. Unfortunately, Nellie is up at Woodstock School at Landour.—Just like me—I find that I chose the longest, hottest, and costliest route to the Panjab but I did it on the advice of a friend who said he knew. Mamma was expecting me two days before I could possibly have arrived and insisted on meeting every train. Then on the way up from Karachi (may the gods protect me from another trip through the Sind deserts!) I made a botch of everything by telegraphing that I would arrive *Wednesday* when actually I arrived *Tuesday*. It was just as well though, for I surprised them and saved them a trip to the station in the burning heat.

The family had plans for keeping me here five or six months! It was hard to have to disappoint them but I think they understand now why I cannot stay more than four or six weeks. . . . My mother just remarked that she was "very

lazy these days." It is HOT. She is one of those persons (and so is my father) who is used to working steadily, from early till late, and if she happens to sit around for a while, she considers it a sign of laziness.

I hope you won't feel anxious about the plague out here for I will take all proper precautions. No Europeans acquire the disease unless you count the few nurses and inspectors who have foolishly spent nights in plague-infested villages. The mortality is higher than in any year since 1896. Week before last there were over 2000 deaths in Ludhiana district (1617 sq miles). In Ludhiana proper, there are 40–50 deaths per day. Funerals pass the house frequently. A great many natives have left the infested city quarters and have put up temporarily in the country. . . .

May 13, 1905, Ludhiana: . . . I had a little attack, something like pleurisy, a few days ago and put on a mustard plaster. I succeeded in warding off the pleuritic attack and am now recovering from the plaster. My mother has been worrying and worrying because she has always prided herself that her mustard plasters never blistered. It is nice to have something like this happen though, just for the sake of the parental attention it creates. My father and I took a trip to Lahore. I didn't enjoy it as much as I might, for the mustard plaster had a delayed action. However, ice bags did wonders.

This afternoon I have to speak to the native girl medical students at the Ludhiana Mission Medical School on bubonic plague. Please hold your little finger for me. I have half-way succeeded in bluffing the Anglo-Saxon so I feel more confident about the Asiatic. Fortunately they have a microscope so I can show a few slides; and then I have some photomicrographs with me.

Our thermometer is broken but it is about as hot here as in Lahore—112 in the shade. One place in central India reported 120 yesterday. We sleep on the roof every night and it is comfortably cool in the evenings and mornings.

The statistics of plague for the whole of India show that the number is gradually diminishing. But this fact is not yet noticeable in the Panjab. There were 60,674 plague "seizures" and 52,253 deaths in India last week—30,909 of these in the Panjab and over 2000 in Ludhiana. There have been

REUNION IN LUDHIANA IN 1905.
THE REVEREND E M WHERRY, AB, AM, DD
AND HIS WIFE, CLARA MARIA BUCHANAN

no cases among the native Christians. The Mohammedans are the hopeless class. Their *mullahs* (priests) ought to be shot for they forbid all good adherents to leave their plague-infested homes, saying that if they do so, they show opposition to the will of Allah. Those who "go out" are deprived of their burial rights and have no procession to follow them to the grave.

May 24, 1905, Landour Hills: I have no idea as to what I am to do next winter. When I left Chicago, Dr Hektoen said that if he were living when I returned, he would find me a place. Enough work to keep me busy and enough money to enable me to live are all I ask.

My father and I spent a day and a half at Kasauli where the Pasteur Institute of India is located. I am glad we went, for now I am acquainted with one of the most delightful men I have ever met, Lieutenant-Colonel Semple, the director and founder. The antivivisectionists, you know, have enough influence [in the British Islands] to prevent the founding of government Pasteur institutes. So Dr Semple of the Royal Army Medical Corps and an assistant to Dr A E Wright (the only original pathologist they have in England) came out here and founded one which is supported by voluntary contributions. I will tell you more about the place and of the enthusiasm of its founder and his assistants when I return. But you will gain some idea of the excellent work that is being done when the last year shows that out of 612 patients which came here from all parts of India for antirabic treatment, there were only .81% failures. Between 70 and 80 patients are under treatment now. India is a hotbed and perhaps the birthplace of rabies. On account of the ignorance and superstition of the natives but few of those bitten come for treatment. However, the successful cases return to their friends and so the work is gradually gaining headway. Another institute is now to be founded in Madras.—I am invited to "tea" at Woodstock School and *have* to go. I hate teas and all their kind.

May 31, 1905, Landour Hills: I wish you were here to enjoy this beautiful scene. My father and I are baching it at Woodstock cottage, a very nice little place stuck on the southern slope of this hill which runs up to *Laltibba* (red top) about

7000 feet above sea level. . . . I am glad of this trip to the hills, for the walks and mountain air have made me feel like a different being.

June 7, 1905, Landour Hills: I wish you had been here to help us two days ago. A coolie who was quarrying down in the *khud* had a large rock fall on him producing a compound, comminuted fracture of the lower third of the left thigh. Miss Dr Mitchell, who has charge of Woodstock, Nellie and I had to do what we could for him. Nellie gave the chloroform while we put on the plaster splint. Miss Mitchell worked for some years in the clinics at Rush. I felt quite relieved that someone who knew something about surgery was within reach. As far as we can judge at present, our patient is doing well.—One can find plenty of medical work to do in India. Since coming up here I have had two cases of infection of the feet with lymphangitis to treat, and, in spite of my training, both cases recovered.

MARINE BIOLOGICAL LABORATORY WOODS HOLE LIBRARY MASS.

The dust storms here are frightful. I have not been able to see Dehra Doon Valley for the past three days. The clouds of dust blow across the foothills, cover the floor and blow up here into the first range of the Himalayas. Oh, India is a delightful country! The dust is so thick that I cannot see St George's College across the *khud*—about two miles as the crow flies.

A few days later found him started for the United States. Stopping in Bombay as he had planned, he wrote (June 21, 1905):

I spent a day with an old college chum of mine, Reverend A B Allison, at Itawa which is not far from Agra. It was as hot as blazes. At Allahabad it reached 114 in the shade but we managed to have a good time talking over days at W and J. The punkah, cold baths and iced lemonade helped out wonderfully. Lucky for me, it rained that night after one of those dust storms which add to the charm of life in India; and so the trip to Bombay was not as uncomfortable as it might have been. On Sunday night Allison went to Agra with me and we visited the wonderful Taj Mahal by moonlight and again next morning. One never grows tired of it. This morning I drove six miles to Parel where the Government

 laboratories are. I had a letter from Captain Lamb who is doing the antivenene work at the Pasteur institute at Kasauli to Lieutenant-Colonel Bannerman, in charge here since Haffkine was expelled for his carelessness. I couldn't pay Colonel Bannerman a greater compliment than to say that he is another Colonel Semple. It does one good to meet men like these. Colonel Bannerman showed me over the Institute, located in a large old Portuguese building which used to be the Government House, surrounded by the most beautiful grounds I have seen in India. I saw the preparation of prophylactic from A to Z. The technical methods have been greatly improved. Colonel Bannerman is going to present me with a jar of specimens which will interest you—the cobra, Russell's viper, and the krait—the three most venomous snakes in India.

June 24, 1905, he was still in Bombay; and still enthusiastic. Said he:

I have certainly enjoyed my visit to the medical men here. They are a lot one is proud to know. Night before last I dined at Captain Liston's home along with his wife and Dr Martin, director of the Lister Institute of Preventive Medicine in London. Dr Martin heads a commission here which has settled down to work out the problem of plague transmission in a sober-minded and careful manner. He is delightfully frank and jovial. Captain Liston, as you may know, along with Captain James, has done most excellent work on the *Anopheles* of India. I bought their book this morning.

On June 28, 1905, he was back in Colombo:

I arrived here yesterday morning after quite a rough trip across from Tuticorni. They have not had plague here so the quarantine regulations are strict and all white passengers from plague infested localities have to present themselves to the Port Sentry Office every day for ten days after their arrival; or up to the time they leave. Hundreds of coolies are imported daily from southern India and these are kept in quarantine for ten days after their arrival.

Dr Castellani is very nice and I expect to visit his laboratory every day up to the time I leave. I am having a galvanized iron box made in which to repack my cultures. They are

uncontaminated up to the present but I suppose some of them will be dead by the time I get home.

These "cultures," of course, Wherry had lugged out of Manila. Not in his manifest were jars of major parasites, more jars carrying large portions of human anatomy, countless boxes of slides and those vipers given him as souvenirs of his journey across India (still to be seen in what was the innermost of his sanctum in the university of Cincinnati). For the rest, his baggage was rather light. So it was that he stepped aboard the *Zieten* of the North German Lloyd on July 2, 1905, due to land at Havre some three weeks later. Of the total adventure he spoke but rarely. It was not because it had been hard—for endurance was the indispensable ingredient of the philosophy of romance by which he lived—but because unbearably filthy. He had been able to make India third class, but he had not been able to get away from it except fourth class—such were his finances. Under this designation, he had become freight of the "self-moving" variety, which was to say, one with the cattle and swine.

He thought it good fortune when he discovered himself the owner of a high-lying bunk in the hold where he was locked. Before the second day out, however, his heart was wrung by an unshaven Russian with much cough. Wherry believed him tuberculous and would have had no mixed feelings toward him if the poor soul had not employed the one wash bucket for cuspidor. It compelled distance on Wherry's part, which he said received cruel rebuke on the third day when the Russian asked to borrow his shaving apparatus. How he finally managed, he detailed when off Naples (July 17, 1905):

The ship was so crowded and everything was so vile that I thought I would not be able to stand the strain. Halfway over, I was fortunate enough to buy the bos'n's cabin. This is nicely fitted up and I have had it all to myself. One of the stewards serves me my meals here and by the use of a few judicious tips, I have had many delicacies which were not due me. So you see I have been quite comfortable and am feeling quite well.

Wherry went to Paris to visit the *Institut Pasteur*. It was another feature of his wanderings of which in later years he

would not speak. The workers in the institute were always out, he said, and their laboratories, always closed. It hurried his journey to London where he was received more warmly. The object of his quest there was the Tropical institute and Patrick Manson—another place and another man that in future years and in future talks he was not to forget.

Wherry arrived in New York late in August (second-class on the *Kaiser Wilhelm II*). Miss Nast (now a fourth year medical student) was vacationing on Lake Erie and Wherry stopped off to see her. Whereafter he took train westward to Chicago. Domiciled there with his sister in River Forest, he wrote me:

I must tell you that as soon as I was able to get a suit of Uncle Sam's clothes in New York, I made a bee-line for Ohio. Marie had me visit her there. Well, I can't tell you everything—can I? But next day we picked water-lilies together and it is all over! . . . It was an entirely different thing getting her parents' consent, for they do not consider me religious enough. . . .

Here was first notice that Miss Nast was now Marie. And as to the last sentence of his letter, this situation was to be reversed a year later when the elder Wherrys were for the first time to meet Marie. It was then that *they* were to have doubts regarding *her* basic faiths.

Wherry's return to the campus of the university of Chicago and to the smoke-laden atmosphere of Rush must have struck him much as a toper's descent from brandy and soda to sarsaparilla. The prodigal had visited strange lands, had seen strange sights, had grayed psychologically in his journeyings. At home, change had moved at slower rate. The place that he had held with Jordan had been filled by another, who, obviously enough could not be pushed out. And the queue under Hektoen was as long as ever. Le Count and Weaver had continued as they were; Wells had moved forward to the South Side; but Ricketts and Rosenow were still present—and only fellows. Wherry's solid contributions to medical science were several, but hidden because in government reports, or, as manuscripts still to come from the press. And anyway,

America's institutions of higher learning were not looking to Rush's graduates for educational leadership.

Wherry wrote of his plight as follows:

I am pretty much "out" of things—partly because there is a scarcity of vacancies and partly because my price has gone up to 2000 per. So I am working on "editorials" for the coin and beginning to get ready for the State Board Exams. . . . It is up to me to get something pretty soon or I may have to postpone my wedding day—an awful calamity. If I practice, I think I'll go west. But I am so loth to go into practice that I am hanging off for a while. Write and tell me the prospects for a practitioner out west. P S I have a double conjunctivitis or I should inflict you with a longer tale. P P S My hands are sterile so cheer up!

In spite of his levity, Wherry was in despair. Without funds, without space even in which to work, his mental state was such that Marie, when she again saw him, declared that his affection for her "had cooled." Theobald Smith offered him a thousand dollar job as a stop gap; and almost simultaneously his "dear friend Joe Ohlmacher got busy and got the superintendent of the Iowa State Hospital for the Insane at Independence, Iowa, to offer me a position as one of their ward physicians at about fifty dollars per month with room, board and laundry." He expressed his fears regarding this offer in the words: "I am afraid to go into an insane asylum in my present state of mind. Anyway it wouldn't do, for if I have to practice, I am going where there are flowers and birds."

September 28, 1905, he sent this note to Marie:

Nellie tells me that the coolie Miss Mitchell and I set a broken leg for at Landour is getting along nicely. When he left, he said to Miss Mitchell that since she had done so much for him up to that time, would she please furnish him with a new suit of clothes and some bedding. The cheek of the Oriental is boundless!

August of 1905 had made me the professor of pathology in the Oakland college of medicine. Feeling myself happily situated, I urged Wherry to come west. In answer, he wrote as follows (October 6, 1905):

94 . . . To tell you the truth I *am* rather worried. If I thought I would get a laboratory position by waiting, I would do so. I am damnably independent and although this policy is a good one anywhere, it is somewhat overshadowed by pauperism. I spent all my money travelling and am not making anything to speak of. Still, I think I can borrow a couple of hundred of the filthy on my life insurance policy. . . . Oakland appeals to me and if you could fix up some sort of arrangement at the medical school, so much the better. You say the place has no money. Does that mean that there is no exchange of lucre whatsoever? Yes or no might express the difference between life and death. . . . The fact is I am tired, and it goes against the grain to wait for someone else to do something for me, so I am going to strike out for myself just as soon as I can get ready for a state board exam. . . . What must be, must be; and I am good on the still hunt. . . . If it looks as though I could get a start (at the medical school) I'll come.

October 28, 1905, he said:

. . . Pardon me for writing a letter which seemed "blue." I shall immediately discard my blue writing-pad and buy a red one. . . . I have been showing Dr Musgrave about for the past three days and only regret that I could not give him a better time. He left last night for San Francisco on his way back to Manila. . . . I think I will wait here and talk things over with you in December. I could not raise more than a couple of hundred just now and that seems too little to risk going west with. . . . *Paciencia!*—something will turn up.

His father wrote him that he was "sorry" because he was "seriously considering going west" and advised: "Secure a good practice and surround yourself with the means of pursuing investigation independently. My prayer in it all is that you may be divinely guided into that sphere where you can best serve God & humanity." Then to comfort his son's soul, he added: "Dr Semple called after you left Kasauli and said many things complimentary, among them he wished you in his research establishment."

Late in November, I was on my way to Europe and had agreed to meet him in Chicago. The place settled upon was a saloon which had been a favorite of student days. I found

him in the back room clad in an army overcoat bereft of its buttons and frogs, bought from an officer in the Philippines. Half through our stew, he turned to me to say: "You know I won't be able to pay for this."

His Christmas days, however, were brighter. Marie had asked him to Cincinnati for the week, better to know the family. He had met its membership only casually before—the Reverend Dr Albert J Nast (stanch and intellectual Methodist of such charm that an unbeliever once said of him: "If he talked to me an hour, he would make me a Christian"); Aunt Fannie Gamble (the sister of Dr Nast, who had taken the place of Marie's long dead mother as her guardian angel both spiritually and materially); the second wife. Their days together went happily except for restrictions imposed upon Wherry's smoking. What had become his habit in this direction may as well be told here. He had been graduated from medical school without the touch of wine, women or weed upon his lips. In the Philippines, Woolley used to say, the wine had made the hurdle because the weather was depressing; and there, too, the tobacco had gone over. It was both soothing and cheap. Wherry was to prove himself the world's hardest smoker and of the worst cigars. He began in the morning of days when men still wore night shirts and his last muscular movement at night was not the switching off of a light but the killing of a cigar. Early broken to what only Malays, trained on papa's stumps in the Philippine archipelago, can endure, he was graduated to "3 for 5" stogies on arrival in U S A, to change, as his prosperity increased, to "2 for 5." After marriage his wife used to buy stogies for him in what she called "muff boxes"—and three such at once. He died still believing their tobaccos of unequalled quality.

Wherry's confidence that "something would turn up" was not misplaced. While in Cincinnati Hektoen wrote him (December 26, 1905): "I have what I think very good news for you. You do not need to hurry back but so soon as you return, please come in so I can show you the promised land."

V

HEKTOEN'S promised land, too, lay in the west. The Amalgamated copper company, situate in Anaconda, was at the moment in suit with the farmers of the district regarding the toxicologic effects of smelter fumes. The farm stock had been dying there because of the fumes the farmers said; the company did not know; so the question at issue was what was killing the animals. January 3, 1906, Wherry wrote Marie out of River Forest, as follows:

I start for Anaconda, Montana, at 9:00 to-morrow morning and can't say how long I'll be gone. . . . I will try to collect material and complete the work in Chicago. I will at least be able to get out of debt again and perhaps make some of the money we need.

He arrived in Anaconda in the night of the sixth. By the eighth he was established and wrote me: "Hektoen . . . fixed it up for me at $200 a month and expenses, and next a m after reaching Chgo I left for here. . . . They want a horse disease investigated." A more detailed account of what his new life was to be appeared in this letter:

You probably know what an organization "Amalgamated Copper" is. It has enormous plants here. Marcus Daly tried to make Anaconda the capital of the state but failed. He put up this hotel, which is a peach, a fine library, theatre, etc. The company has a large arsenic (one of its by-products) plant here & last month turned out about 150,000 barrels—enough to pigment the whole Caucasian race. Well, about three years ago a large number of cattle & horses in the surrounding county died, and the fumes from the arsenic mill stack were made the cause. The company settled with the ranchers for $35,000 and everything was O K. An improved stack was put in at the cost of $1,000,000 which collects most of the solid matter from the fumes and from which they get

20% arsenic. I can't give you all the details of the present trouble as it would require reams of paper. But about a year and a half ago the ranchers started a new scheme for getting easy money and with the help of lawyers & veterinarians are about to bring suit against the Co for $3,000,000, while applying for an injunction to shut down the mills. Statistics show that stock loss is not greater than usual nor greater than elsewhere in the state. The company is getting advice from Theobald Smith, Welch, Adami, Moore, etc. The greatest veterinarian in America, Dr McEachran of Montreal has just left me. I must tell you more of him sometime, for he is a grand old Scotchman. The farmers claim that the arsenic causes a rotting away of the nostrils of their horses and as hereabout they have a peculiar disease of the nostrils, the farmers are making much of it. Dr Gardner of the veterinary school at Bozeman, has been working on the disease but as he is not a bacteriologist, I was sent for.

I am struck with the fair-mindedness of the company's officials. They say: "If it's arsenic we want to know so that we can make reparation; if not, then find out what it is so that we will not be done." There are a number of suits throughout the country waiting to see how this one turns out. Dr Spelman, who has charge of the Sisters of Charity hospital here, and Mr Mathewson, the mgr of the Co have already started a movement to keep me here permanently. If I can get good pay and facilities for research it might not be a bad idea. There is no bacteriologist in the state.

I'm afraid this life will spoil me. This matter of living on the best of the land and not paying for it is too much for me. It may make future difficulties harder to bear.

12 P M—Well, the lab business is going through all right with permission from Mr Mathewson to order any amount of apparatus we want and Dr Spelman hot on the idea of having it established in the hospital. It looks as though we may work up a good research lab at the expense of Standard Oil.

On the next day he said:

To-morrow I move the laboratory, that is what there is of it, into St Ann's hospital. The Mother Superior turned over two fine rooms to me.

Even before the week was out he had reverted to a love of his medical student days and planned "to carry on some experiments with opsonins." The circumstances of his newfound job brought back his silent laughter and he penned:

By the way, I have been thinking that you ought not to publish your new book without a fitting dedication. I do not wish you to strain your brain over the subject but how would this do?—

To that habit of continually falling into Debt, and
To that Custom of Borrowing which has kept me in a state of perpetual penury, and thus furnished a most potent Stimulus to a Naturally Lazy Disposition, and
To Those Kind Friends who have loaned to me in my extremity, and especially
To Her who has helped me spend the Money.

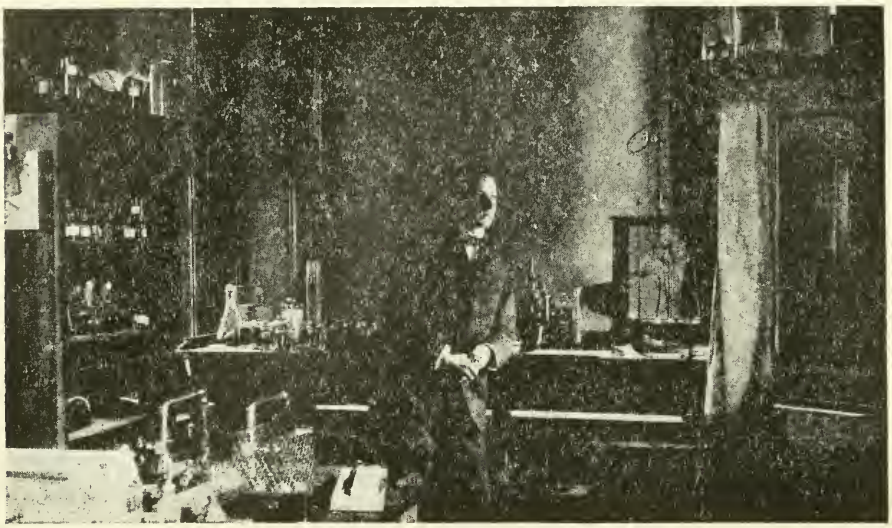
But, without joking, this is not bad:

To ransom Truth . . . rally the scattered Causes;
and that line which Nature twists . . . untwine.

This is sacrilegious perversion by excerption which would make Sir Thos turn over in his grave. . . . And, by the way, I will not need to borrow the money now. In fact, if you happen to get stuck and don't ask me, I'll feel hurt. I have not been paid yet but feel sure that I will be.

By January 17, 1906, he could say that he had "finished up the list of supplies for the laboratory" and that "it came to $788.00." He continued: "I expect it will reach fifteen hundred but the Copper Company makes more than that each minute, I think." On January 18, 1906, he wrote of a side line into which he was being pushed:

There are many nice people in this town of about ten thousand. The climate and altitude ought to make the place healthful but, of course, the population is subject to most of the ordinary ailments. They had epidemic typhoid last fall. There were two deaths from diphtheria day before yesterday and some even contract tuberculosis here. The place needs a bacteriological laboratory. The deaths from diphtheria, a mother and baby, were inexcusable and the manager of the



IN THE LABORATORY, ANACONDA

Company, who has a family of children, was quite excited over the affair and this morning asked me to install the regular method of diagnosing diphtheria bacteriologically. So Little Willie gets busy making up Löffler's serum. No work of the kind is being done in the state and we can get such work to do from Butte and other places, at least enough to pay for breakage.

Those who remember Wherry out of the flesh will appreciate what such a story as he tells in the following letter (January 21, 1906) meant to him:

Yesterday afternoon I went to Butte with Dr Spelman and met a lot of the physicians. Most of the men plainly showed their disappointment at the Company establishing a laboratory in Anaconda, a smaller place. Dr Spelman took delight in stringing them. He started by telling them of our three thousand dollar laboratory here and ended by talking of our five thousand dollar equipment. We will install necessary means for diphtheria diagnosis both here and at Butte and most of the doctors say they will be glad to send their specimens to us instead of east or to San Francisco.

On January 24, 1906, he wrote:

I made cultures from the throat of one of the Company's men this afternoon. His membrane is probably due to a streptococcus but it served to initiate the West into up-to-date methods. However the scheme for incubating the cultures is old. They are in my inside vest pocket. The only incubator we have at present is at the shop having an electrical regulator installed.—I have just heard that it will be necessary to make a fifteen mile drive to-morrow morning to autopsy a horse which went crazy owing to the effects of smoke and arsenic.

Sub rosa, he communicated the finish of this horse tale twenty-four hours later:

I have been working on that crazy horse all day and am just about asleep. The horse had cerebro-spinal meningitis and I am trying to isolate a small bacillus present in large number.

Before the month was out, Wherry was beginning to feel the smart of partisan battle (January 29, 1906):

The *State*, a paper published in Helena, said to-day that all the so-called "experts" are hirelings of Amalgamated Copper ready to perjure themselves at a moment's notice. I suppose that makes it so, but as I am not an expert and am not expected to qualify as such but simply as a bacteriologist, that lets me out. It calls Anaconda "the city of whispers where one's soul is not his own, where no one dares to speak his mind openly for fear of Company spies." I only hope that they don't read my love letters. I can't say whether I am on the right or the wrong side of this case and as it is for the United States Court to decide, I shan't worry, for all the evidence I shall present, will be simply a matter of fact.

A letter dated January 29, 1906, made casual record of the painstaking methods pursued by him all his life in the prosecution of his scientific studies.

We have a lot of media ready and to-morrow we'll have Percy throw and tie that sorrel cayuse and then we'll go back of that ulcer in his nose in real surgical fashion. When we get some pieces which are presumably free from surface contamination, we'll make aerobic and anaerobic cultures in Löffler's serum, glucose bouillon containing unaltered horse serum and some containing horse serum heated to fifty degrees for an hour, and in plain glucose agar. Then we must make a sterile salt solution suspension of some of the tissue and inject it into the nasal submucosa of a normal horse. You see we don't even know yet that the disease is contagious or inoculable. If it is inoculable we must find the cause.

With such thoroughness he did everything that needed doing. On Sundays his assistant was likely to take the day off. Wherry would then "play char in the laboratory, feeding the animals and scrubbing and sterilizing the floors." He reported upon another horse, supposedly dead of smelter effects but really dead of an infectious disease, February 14, 1906:

Along with the veterinarian, Dr Gardner, I posted another crazy horse yesterday—a case of strangles with multiple abscesses in the cerebellum. I have so many cultures going that I often work after supper. But now that I have all past and present specimens systematized in my note books, side cabinet and specimen bottles, it is a pleasure. To show you how much

the Sisters appreciate laboratory work—the Mother Superior asked me the other day if her chickens ran any risk.

His friend Woolley reported to him on the state of affairs in the Manila laboratory (January 24, 1906):

I go to Siam on April first. . . . That 3000 is *gold*. You know, I suppose, that Herzog is leaving, Musgrave given notice of his resignation, Clegg and Will Young pulling out. Clover leaves September and Jobling has been cabled for. Sorrel leaves July. Tavern has resigned, Forbes is not coming back, Timmy Smith is to be Governor and Gen Wood Secretary of Police. Everyone has congratulated me and asked me to keep my eyes open for them in Siam. . . . You old Slob, why didn't you take up Theobald Smith?

"Twenty degrees below zero" registered in middle March brought Wherry much satisfaction. "This very cold weather will do me a good turn, for they will not be able to kill so many horses and I'll get a chance to get caught up." The Copper company was, as a matter of fact, going into the business in no superficial fashion. Wherry referred to it—with some other things of importance—in a letter to me (March 16, 1906):

. . . I am sixty dollars a month better off—with a definite contract for a year. So this is where Little Willie gets a ring next month and if you will stop off at Balto you may see something of what Amalgamated can do! . . . I am sorry you are not here *now*. They want a man awfully bad to do paraffin section work. Don't laugh! . . . The fact is these people don't know what they are getting into. Before they are through killing, we will have tissues from several hundred animals.

A single day told of the "putting away of the tissues from thirty animals." To Marie went the word: "You'll be interested to hear that the rabbit inoculated from the original crazy horse I told you of in January, died a couple of days ago with cerebral symptoms." Toward the end of the month Theobald Smith arrived and made two autopsies. "I can tell you they were careful ones," Wherry reported, continuing: "It is a great treat to have him here for he knows so much and has such a fine way of imparting his knowledge to others." The

work and personnel of the laboratory increasing, more space was deemed necessary. Wherry reported his quest for it (April 4, 1906):

"Busy" might well have been written over the laboratory to-day. . . . Mr Mathewson wanted me to ask for another room at the hospital as we are getting crowded. I did it as nicely as possible for me, but the sweet old Mother Superior grew as sour as a sour apple and told me we couldn't have it. Then she recounted the worry and trouble I had brought her. "Why," she said, "we haven't been able to hang the clothes in the back yard since you commenced the animal house." This, after I went to the trouble of having heating pipes and a register put in her chicken house!

On April 11, 1906, he recited Theobald Smith's own story of his great and first discovery of the transmission of an infectious disease by an intermediate carrier:

Dr Smith told me that he worked for three years on the transmission of Texas fever by ticks, for it was so strange and unheard-of a thing that he had to convince himself over and over again before publishing the fact. And then no one believed him or paid any attention to the fact for five years! Think what a field in our present day notions of the transmission of the infectious diseases that opened up!

To this he added: "Dr Smith was feeling ill yesterday and *I* prescribed for him. Trustful man! He took the medicine and says to-day he is feeling well enough to go out to-morrow."

AT different moments in his life, many different labels were affixed to Wherry. Often referred to as a "medical scientist," he was more often called an "epidemiologist" or a "public health worker." Such men seem cold, because numbers and statistics too frequently displace in their memories, family and given names. Wherefore, the item is of interest that Wherry never thus lost a story because of the pagination. In part it was family tradition—he was the son of a minister; and the churchly fathers of the nineteenth century preached no gospel more clearly than that Christian service meant service to human beings. From the first he knew that

plagues killed *men;* and that leprosy withered *human* arms and legs. In Anaconda his sight did not dim.

"There is a poor fellow in the room next to mine with advanced T B," he wrote (March 4, 1906). "I must find out to-morrow if I can do anything for him. It is awful to hear him suffer and not know who he is or what he looks like." On the day following, he added: "I saw him this morning. He is a little old gentleman, with sallow face and deeply sunken eyes. He worried me so much last night that I got up and took a double dose of trional." And thus (April 13, 1906) he reported of a second "case" concerned not at all with the smelter business:

I must tell you of my other sweetheart. How can a man stick to only one when there are so many lovely girls in this world! Elsie Mary Besant of whom I told you before, had another attack of chills and fever yesterday and now they come daily, though when I wrote you three weeks ago they were distinctly tertian in character. With the cessation of quinine they returned and, lo! her poor erythrocytes are crammed with a double or triple brood of the infernal parasites. One band is in its infancy, another well matured, while some of the imps of hell are segmented. A remarkable instance of double or triple infection, latent since last September. Elsie is the sweetest little four-year-old you ever saw; and the poor little angel has whooping cough, too; but to-morrow I get after the plasmodia. The hospital is neglecting the amœbic dysentery case, too, so I am superintending his treatment myself. He is so emaciated and wants so much to get well, and his wife and little girl are so anxious, that I really feel conscience-stricken at not having paid him more attention. Of course he is not my patient but he will be hereafter! Just think, he has had it for three years without treatment!

A succession of letters (for the most part to Marie) described his activities of a subsequent month:

Easter Sunday 1906—I had not thought of the day until yesterday. Just now I must to the laboratory. We filled little Elsie with twelve grains of quinine hydrochloride yesterday morning. This morning I found only one parasite [in her blood] and think we succeeded in killing off one of the broods.

106 *April 16, 1906*—To-day Dr Spelman and I gave antitoxine to two wee ones at the Westside convent. One is serious—complicated with whooping cough. Her name is Thekla. The other is a tiny girl usually full of life and sassy, but to-day very meek.—Elsie showed me her new red and white dress.—It is very hard to educate the doctors to the necessity of giving prophylactic doses of antitoxine. I shall try again to-morrow. . . . I have my room all rearranged and soon will have some photos of Philippine types hung up. Then I shall feel quite at home among the savages again.

April 30, 1906, Monday night—I must send you a line to-night since I neglected you yesterday. It was a strenuous and expensive day, and it served me right, for it was Sunday. After working all morning I received a telegram from Dr Ricketts asking me to meet him in Butte if possible. Thinking it something important, and as I could catch him in no other way, I hired a team and drove ten miles in forty minutes to Warm Springs to catch his train. I found him on board with Dr Chowning, on their way to Butte and Helena—Ricketts perforce, and Chowning with a crazy idea of petitioning the Governor to allow them to inoculate one of the state criminals (life sentence) with "Spotted Fever." The idea might have been a good one if everything that could have been done, had been done. But so far only a few mediocre men have worked on the disease and none has even tried monkeys. Ricketts is trying to get some but cannot afford them. The disease is not contagious but must be frightful. They told me of their two last cases which turned almost black before death. I am going up one of these days to see some of them and have arranged to supply Ricketts with guinea pigs and media. Who can tell? Perhaps Kismet sent me out here just to help in this way—and *not* primarily to separate me from you!

Little Thekla died a few days ago of uræmic convulsions when well convalescent from diphtheria. I felt like saying "I told you so," but refrained, for they wouldn't push the antitoxine at the start. She was such a patient and sweet little thing too. I went to-night to make cultures from the rest of the family to see if we can break quarantine after fumigation. Did I tell you about their method of fumigation

here? I told Dr Spelman that they might just as well set their formaldehyde generator on top of one of these hills and let her go; or throw so much formaldehyde solution per month in the Warm Springs creek. In this way they would spend just as much appropriation and avoid giving the inhabitants a false sense of security. Their method doesn't touch even moist cultures. The apathy of the physicians concerned is disgusting. Fortunately, one meets fine exceptions (like Drs Spelman & McKenzie) and is preserved from early pessimism. But I can see that it will be a continual fight, for the public too, is most thoughtless. It has grown to expect these things and cannot imagine better conditions. . . .

Well, I think I've done pretty well for a man who didn't go to sleep until three this morning. If you won't tell anyone I'll confess something. You see I had to wait three hours for a train last night and Butte is *such* a tough place that I went to see "Monsieur Beaucaire" in self-defense. [It was Sunday.] That story is better than 90% of the sermons one hears—or, I should say, *has* heard.

P S—I couldn't help falling in love with the heroine, Lady Marie, for like you, she marries her love though he is poor, but unlike you, finds that in loving a barber she has won a prince!

May 1, 1906—I gave Elsie four grains of quinine this morning to drive out any parasites latent in her spleen and this afternoon found her blood full of adult parasites—two or three in every field of the microscope. Poor child, she has an awful time with the combination of whooping cough and malaria.

May 6, 1906—To-day I expressed Ricketts some media, worked on some cultures, made two diphtheria diagnoses and cultures from the blood of two young fellows who are suspected of typhoid. They had an epidemic, milk or oysters I suspect, in the school in Spokane and about twenty were ill and some died. The school was closed and the boys came home a few days ago and just developed symptoms. So you see the diagnosis work is progressing.

May 7, 1906—It looks very much as if we were going to be at the head of the Union in public health matters. I have been talking notification and laboratory control of infectious dis-

 eases since I came here and to-day Dr McKenzie, the mayor, presented the matter to the town council which agreed to pass and enforce any laws we saw fit to present. So we are going to make compulsory the notification of all sore throats, from each of which a culture must be submitted. All the work, free of charge! We are also going to make the notification of typhoid, pneumonia and tuberculosis compulsory and we hope to put the method of disinfection on a satisfactory basis. We shall keep all diphtheria convalescents in quarantine until their throats are free of bacilli. We will get the laws passed and then see if we can make the physicians coöperate. We also have a scheme in mind to furnish antitoxine free to those who really can't afford to pay.

AS Wherry watched in his laboratory, the articles written by him in Manila had one by one come to view in the United States. The manuscript for the last [*14*] had been delivered into Hektoen's hands at the end of his waiting period in Chicago. Now this was printed. It had to do with the cause of a contagious blister disease he had encountered in the Philippines. This pemphigus he ascribed to a microörganism newly discovered by him and dubbed the *Micrococcus pemphigi contagiosi.* He had isolated it from five cases, reproducing with it, the disease. "The kidney shaped diplococci" were not to "be confounded" with the ordinary staphylococci, he warned.

He had written Marie that this paper was to be the product of his and Woolley's labors. But Woolley had not been concerned in it. It appeared instead with Moses T Clegg as coauthor. This future assistant director of the U S leprosy investigation station in Hawaii was then twenty-nine. He had been a graduate, almost, out of the University of Arkansas when he entered the medical division of the U S army to serve through the Philippine insurrection; whereafter he had been nominated the assistant bacteriologist in the Manila laboratory. Six months ago Wherry had written Clegg that he intended to use his name. Clegg responded (December 19, 1905):

Your kindness was certainly appreciated in giving me more credit than I deserve in that article on pemphigus; and will never be forgotten. . . . I have been leading a fairly moral life since you left (don't misconstrue that sentence). You remember last New Year's Eve. I do, with horror. Since then *I have been good*. . . . I wish you would call on my sister and make black seem white in regard to me. . . . Have made several examinations of that little Jap girl's blood for filariasis but have been unable to find any parasites . . . Joaquín and William send best regards. Joaquín's face was a pleasure to see when I told him of your message to him.

To further gossip about the non-scientific goings-on in Manila he added the wish that Wherry help him get into a medical school. It was after this letter that the pemphigus article had come from the press with Clegg designated its senior author. This incident, so chronically characteristic of Wherry, and so obvious a reason for the enduring affection that all his laboratory associates bore him, brought this response (July 12, 1906) from Clegg, now resigned from the Manila laboratory and on his way to study medicine in Tulane:

I was greatly surprised to see my name before yours on the reprint but I have taken precaution to inform all I know that Dr Wherry was the "man behind" . . . It would be absurd to make an excuse to you for my long silence. However, you understand our condition (physical) over here, so enough said. . . . I am still at the Civil hospital, and, by the way, I have a case on hand that is indeed interesting. Do you remember a tall, blonde nurse? I am her beau at present and a little loco. Dr Wherry, love in the tropics is awful . . . I have made several other examinations of blood from your little Jap at all hours of the night and day with negative results.

The exhibition of such humanness would, like nothing else, bring color to Wherry's cheeks and elicit his never-to-be-forgotten smile. At this time, too, he was permitted to read more austere medical opinion of him. Victor G Heiser (then thirty-three, chief U S quarantine officer of the Philippines and the newly appointed director of health) declared of

 Wherry's bulletin on glanders: "A paper pronounced in Europe the best that has appeared on this subject."

While other duties had so filled his Anaconda days that writing was largely impossible, he nevertheless did get two items into print. They were important as having to do with the geographic distribution of disease. Under a single heading [*15*] he told of a patient ill with amœbic dysentery who had never been outside of Montana; and of another, harboring a chronic malaria. Opinion at the time believed the bowel infection possible only in those who had come in contact with the Orient; and the malarial patient had become infected of the plasmodium in regions believed to be free of all the circumstances necessary for its transmission.

Wherry's hours were now filled of three interests—there was his official quest which had to do with what was killing the farmers' domestic stock and charged by them to the fumes emanating from Anaconda's smelter stacks; that really more heart-warming interest which, as side line, was his bacteriological-diagnosis laboratory; and, of course, that Spanish castle upon which he had set his heart. May 18, 1906, he wrote to Marie: "We will live in hope. There is no chance of my having any money laid up by fall, but if this position is assured we could risk getting married on the prospects." Under the other heads he reported that the work on the horses "was going along nicely" (he had isolated the *Bacillus necrophorus* from a number of their nasal and laryngeal ulcers) and that his diagnostic efforts were bearing fruit. May 19, 1906, he detailed:

. . . about this typhoid epidemic which broke out at the school in Spokane. Quite a number of the boys died there, and the rest were sent to their homes all over the West. Most of these have since developed the disease. There are six cases here, three under the care of Dr McKenzie, and I have made cultures and found the typhoid bacillus in two. The master in charge of the school asked me to examine and report on the water of their well. He sent a sample last week. It was *so* sterile that I refused to report. I believe the old rascal boiled it before sending, but, of course, cannot say so, for one may not risk accusing an individual who might be innocent. To-day we

THE REVEREND ALBERT J NAST, AB, AM, DD,
CONFERS WITH WHERRY IN ST ANN'S HOSPITAL, ANACONDA

 received a *very* nice letter asking for our results which would be published in the Spokane papers and a copy sent to the parents of each boy. I may be mistaken but I think I am on to the old fellow.

Wherry's point of view in general matters of medicine had not left unaffected either the men of his Company or the doctors of the place who had come in contact with him. One of these, frequently referred to in superlatives by Wherry (Thomas J McKenzie, 39, into medicine and politics out of Kentucky), was the mayor of the town. Together they cooked up a series of ordinances aimed at the report, control and eradication of various communicable diseases. The science of these laws had been dictated by Wherry; their enactment via the city's council by McKenzie. May 21, 1906, Wherry reported: "Hold your thumbs, for this is an eventful night. The diphtheria proposition is up." Two days later: "the ordinance was passed by the city council last night." On the same day the first "sore throat" came to the laboratory (which, interestingly enough proved to be, in Wherry's hands, not an anticipated diphtheria but an instance of Vincent's spirillar angina). By May 26 "the docs were falling right in line," and "ten throat cultures to-day" had been received. May 30, 1906, Wherry sent Marie a sheaf of newspaper clippings with the words: "It's awfully late but I cannot sleep. I am inclosing a copy of the ordinance itself. It may interest you to see what a formidable thing it is in its legal form."

Anaconda's population, however, did not lose sight of the fact that behind these newly established public health laws there was operative a private mind and worker. Wherefore Wherry found himself visited in the next weeks by committees, family groups and individuals to threaten him with bodily harm if he did not lay off them. As June drew to a close he apologized again for unchristian behavior to Marie:

Busted the Sabbath again. Can't help it, for it will be nip and tuck as to whether we can get ready for the trial by September. Sweet and I will have to work nights in August.—As you suggested, the sections of some of the nasal ulcers have given us the clue which fits in with Dr Moore's hypothesis. Deep in, are vegetable pieces, in all probability the barbed awns of

"foxtail," a grass which matures in the fall when these ulcers occur. Some are surrounded by giant cells showing that they have been there for some time.

His public health activities received notice in a letter of July 31, 1906:

The people in town and in the hotel are scared stiff about the Anaconda water. There has been a small epidemic of summer diarrhœa which I think can be attributed to picnics, green vegetables and spoiled milk. This morning I heard it reported that there were six cases of typhoid in town and one in the hospital, which is all untrue. Also, that hundreds of people went to the "Springs" to get water last Sunday because of it, and that the commission that went last week to inspect the water reservoir found nine dead dogs there. The saloon keepers and soda people are joyful. I have no doubt that they help to spread these reports, for some of their signs vouch for the germicidal properties of CO_2, etc. I am making some tests for contamination in a small way. We haven't time to go into a careful bacteriological examination. The water always smells badly at this time of the year especially after it has been heated. It does show considerable organic matter and in a drop of sediment I found this P M molds, yeasts, spirogyra, ten or twelve different species of protozoa, rotifers, flagellates, ciliates, vorticella, some small crustaceans and bacteria—surely enough to account for the indefinable stink when the water is boiled. Of course, all this is simply "food stuff." I am looking for *B coli.* If you could find out in the library what kind of an odor *B coli* produces, I would be very grateful. Flügge I think would tell.

On August 6, 1906, he added to this report:

Some careful tests for *coli* in our water supply show it pretty badly infected. The source is the Works flume water which they occasionally turn into the city pipes. The reservoir water comes from an uninhabited source, is carefully protected and excellent. I shall report that as long as they use the flume water, the town is threatened with typhoid. That will mean digging another reservoir. But the Company can afford it for they lost a good many workers in the epidemics of years ago. I shall stick to coffee, tea, and *aq dist* until something is done.

This is just to reassure you, for personally I have grown used to taking chances—which is to wait until the thunderbolt hits the other fellow and then be careful. But the Company head (Mathewson) is interested in a safe supply and something practical will be done soon to furnish it. The water in the flume goes to the Works and comes chiefly from Warm Springs creek (on which they hold the picnics) and a good many people live along its banks. So a case of typhoid along the creek exposes the whole town. The water takes but six or eight hours to run its course of thirty-six miles, so the germs are brought down in a jolly good condition.

Wherry wrote at this time that his duties kept him busy as a "slave." His "spare time had been consumed in writing more important messages!" He hoped that I was well and making money "for the coin is so necessary." He did not think that he could risk getting married unless there was "something permanent" to be gotten out of his Anaconda appointment. "The place is on the pig but the lab is a peach," he volunteered. After which he added. "If I don't stay here, I am going to Portland. It is in direct communication with the Orient and might offer opportunities in this way." July 31, 1906, he was still "busy as a louse," and "working late on a bacteriologic report (which is n g but must be done to show that my intentions are good)." Regarding his water analyses he had on hand "a bunch of fresh water protozoa that would do any physiologist's heart good." Still "so busy working for the family that there is no time to think up any names for the bugs," he said: "Whenever the demand arises for a laboratory assistant, horse doctor or crack clinical diagnostician, just telegraph me." I did not telegraph but I was able to send him a letter requesting him to consider residence in the San Francisco Bay region. Late in August he answered:

There is no doubt about what I want to do . . . If I could get a start in California I would do my best to get away from here, though the lab in a peach and 200 a month and expenses are not to be sneered at. What do you think I could get from the Oakland school? Could it stand for $1500 a year all time or $1000 a year with practice on the side? . . . Let me know whether you think my head is swelled or whether one could

get along on less . . . I am "bugs" just now in the hope of getting married next Christmas and cannot think things out clearly.

Ten days later, after registering impatience because of no word from me, he continued: "Marie agrees with me that the amount of money at stake, apart from enough to pay for rent and for shredded wheat biscuit, should cut little figure in deciding where we are to be next year." By October, the authorities of Anaconda were in competition with those of Oakland and Wherry wrote: "they would like to fix up a scheme for keeping me here to run the lab for diagnosis and board of health work but are not sure they can raise the money I asked—$3000 per. The Oakland school gives me a definite offer of $125 'a year.' I accept—trusting that it means $125 a month."

While this letter was on the way he sent a second (October 4, 1906):

Since I have decided to cast my lot with Oakland I can hardly wait for the time to pass—though I will not presume to say that what is going to happen next month does not influence my feelings. Isn't it a rotten system that puts 30 and sometimes as many as 31 days in a month? . . . She is at the Women's and Children's Hosp at Syracuse until Dec 1st and says: "To feel like a green fool and yet to have to act the grand physician is not easy! . . . "

Other epistles out of this period told of his continuous labors for the suit of the Amalgamated copper company. September 26, 1906, he wrote: "I spent all day fixing up museum specimens and fairly reek Kaiserling 3. We have a fine collection; and they are well put up and arranged, if I do say it myself. Dr Smith and Dr Moore will be dying to take them back East with them." Whereafter he added: "I must work harder than ever to prove that I don't shirk in the anticipation of leaving." Marie had written him that the Anaconda group would no doubt be sad to see him go. He answered:

No, no one is sorry unless it be some of the people I had the privilege of helping in a medical way. I think Mrs Gunnis and Mrs McCallum will be sorry for they can't get away

 from the idea that my early diagnosis of typhoid in their boys had something to do with their recovery.

October 17, 1906, he wrote:

I had a nice letter from Dr Hektoen . . . asking me to give him an idea as to what kind of work and salary I wished and he would then let me know if they had anything in Chicago. "You know that I want to do all I can to help you realize wished-for opportunities." Wasn't that kind of him! But I cannot bear to think of going back to Chicago. I shall explain to him in December why I think the Pacific Coast is the place for me. The die is cast for the next few years at any rate.

Later in the month he spoke his opinion of the legal suit in which he was involved:

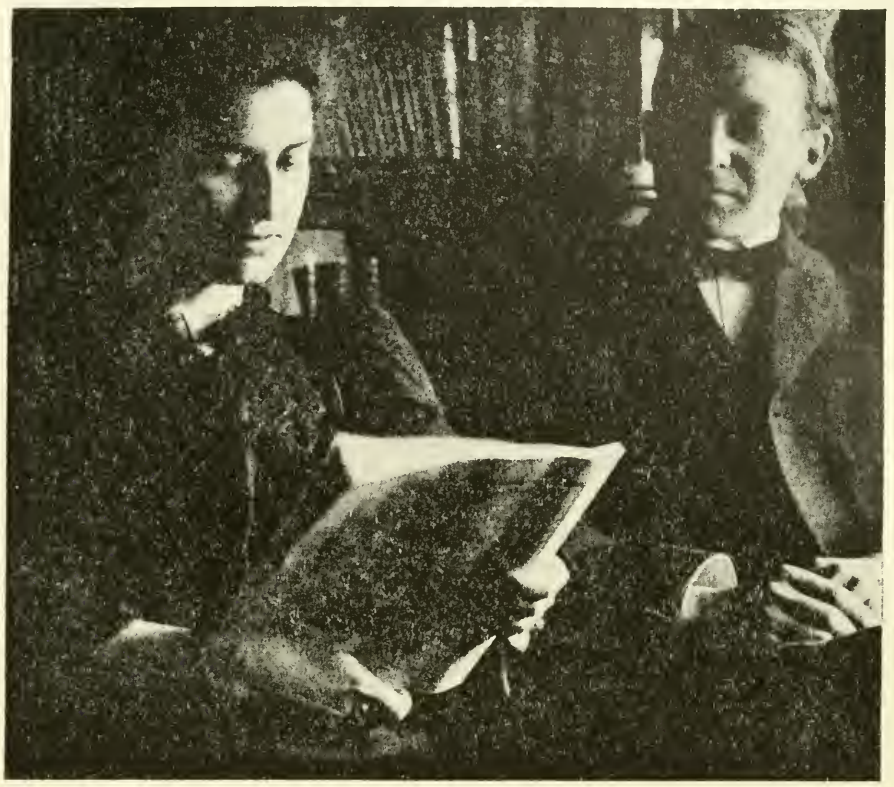
You ask about the trial. As I have told you, the Farmers Association never had any case and most of them are simply the victims of ignorant and scheming veterinarians and lawyers. We will be busy to-morrow sealing and shipping pathological specimens to Butte. Gardner wishes to present them and as I am anxious to keep off the stand if possible, he is welcome to do so. I am only anxious to get away from here.

Wherry expressed here a dread of appearance in public which fairly obsessed him all through life. In this instance the situation looked particularly bad to him because "private" interest was involved. He wrote about it out of Butte (November 12, 1906) when summoned there for expert testimony:

The only thing about this lawsuit which worries me is the fact that people throughout the country seem to think that the farmers *must* be in the right and that Amalgamated specialists are "bought." As a matter of fact the Co is in the right and the farmers deceived by a bunch of rascally lawyers and veterinarians. However, I guess I can stand the rep if Theobald Smith can.

His appointment to the Oakland College of Medicine was acknowledged in the following words:

Hooray for me! "Prof of Parasitology" sounds rather sweeping, doesn't it? But of course if they wish me to say something about the more important animal parasites of man, I'll make



MARIE AND WHERRY MEET AGAIN IN THE FORMER'S HOME,
CINCINNATI, IN LATE DECEMBER 1906

 the bluff. The Pacific Coast is *the* place where tropical medicine must be taught in America. . . .

In the bygone year Wherry had declined the direction of the government serum laboratory in Siam. His Philippine colleague, Paul G Woolley, head of the serum laboratory there, then had taken it. Nothing but the restlessness of his soul urged it, for his move to Bangkok changed his geographic placement only. Since the friendship of the two was to have much to do with the future of each, Woolley's gypsy spirit deserves note. In a letter dated September 18, 1906, he drew his own portrait. "Chief" was printed under his name on new stationery. For the rest, his letter spoke his ever unhappy mind:

. . . hard at work starting this thing. When my two big orders come from Germany, I shall have a fairly good working establishment and shall be proud of it when I am not sick of it. The worst is that I am so alone and with only the literature to talk with, I get morbid on the subject of my own acquirements. I feel continually that I am back-sliding. Alone, I don't think I can stand it for more than my contract time. Can't you get control of a laboratory and take me in, or will you come out here for what I am getting—3000 and a house?

Two years later Woolley was to get command of just such a laboratory and invite Wherry in. In the meantime Wherry wrote:

Just had a fine letter from Woolley. He is well fixed in Phrapatoom. He seems to get all he wishes from the Prince, who is backing up the lab's schemes. But he feels his isolation very much. He wishes to know if I would come out for three thousand a year and a house. I shall tell him to cheer up and wait until we have built up the Oakland school and then we may be able to offer him something there.

For the rest of November in 1906, Wherry was chiefly in Butte; and on the stand. "As usual I am very nervous under such conditions," he said. But he had been promised that he would be through and able to bid Anaconda good-bye by December first, which made him glad. Another note of joy

was introduced by Theobald Smith's presence who had brought Wherry "a nice bunch of his reprints." Then he noted: "I have a peach of a cold and that makes it doubly hard to talk but, never mind, it will all be over soon."

On December twenty-ninth of 1906 (he was now thirty-two) he was married to Marie Eleanor Nast (M D this year from Johns Hopkins). But because of flood interruption the pair did not arrive in Oakland until January 15, 1907.

VI

IN the letters of congratulation that came to Wherry, a number got quickly from felicitation upon his marriage to felicitation upon his work. The knowing and practical Duncan McEachran (FRCVS, DVS, director of the New Walrond Ranche company limited of Livingstone, Alberta) had functioned as expert for the Amalgamated copper company and wrote (January 10, 1907) on company stationery (cattle brand W R on left ribs; earmarks: slit on right ear, two slits on left ear):

While it would have been a great pleasure for me to have had you spend some time with me here, the weather has been the worst in years and you would not have enjoyed it. . . . I wish to congratulate you on the valuable technical work done by you on this great case. The laboratory is a credit to you, and I have no doubt it will be of great value to science in Montana. —Dr Smith wrote me from the train en route east. Like myself he feels sorry that Salmon who had made somewhat of a name for himself as chief of the Bureau of animal industries, should have been so foolish as to go on the stand to his utter undoing. I never had a doubt as to the company winning the case. Now that the evidence is all in and Salmon, the farmers' right bower, was so weak for them, and so strong for us—I know that the verdict will be, no injunction; no damages, with costs; and the farmers so disgusted that they will never try it any more. Salmon and the lawyers will probably have to whistle for their fees.

A letter from Theobald Smith (January 12, 1907) said much the same. Hoping that Wherry would be able to "get a firm foothold in his chosen work in the West" and "be a good missionary to the medical profession," he continued:

. . . I went out to assist in the cross-examination of Dr Salmon. His evidence was very poor for he seemed to know nothing. We analyzed one of his autopsies and spent a whole

day making him take back his statements or acknowledge them to be meaningless. . . . In one case he showed cell infiltration in the kidney. On looking into the microscope, I found a small artery between the tubules cut longitudinally. The transverse nuclei of the muscular coat, being numerous, looked like an "infiltration" to him. I became very sorry for him after 4 or 5 days of his squirming and guessing at answers and left for Boston.

There was black tragedy in these mentionings of Salmon. They referred to Daniel Elmer Salmon, fifty-six, graduate of Cornell's veterinary school and, since 1879, first member, then chief of U S's bureau of animal industry in the department of agriculture. In the late 80's this was where Theobald Smith (nine years his junior) had been; and it was in the name of the two that in the publications of the department, the transmission of Texas fever in cattle had first been ascribed to the bite of a tick. In the federal court, sitting in Montana, these two minds had now been bayoneting each other.

OAKLAND is bedroom to San Francisco as is Brooklyn to New York. The College of medicine there, established in 1902 as a stock company, was five years old when Wherry entered it. Most of its stock had been absorbed by the generous men of its generous faculty who had deemed good the opening of another medical school on California soil (four more were operative in San Francisco alone). Its clinical divisions were headed from the first by men at least fair (Frank L Adams and Dennis D Crowley were its surgeons; W Francis B Wakefield, its obstetrician and gynecologist; Joseph Maher, its medical chief; Hayward G Thomas, its eye-ear-nose- and throat-surgeon). Its scientific divisions were trying to get up to this standard even though the past years, with Pauline Nussbaumer heading bacteriology and the crabbed but scholarly Carl R Krone, physiology, had not been so bad. I had been added for pathology in the year gone by, and now Wherry and his wife had come, who were before long to bring in Creighton Wellman.

The equipment of the school was meagre; but its available pathological and bacteriological material (out of the Alameda

county hospital, chiefly) was the envy of even the larger of California's schools. What was needed were men to handle it; and Wherry was now of the number. Marie's name was added to the faculty list for teaching in physiology. Writing of their professional interests to Hektoen, the latter ventured: "They remind me of the beginnings of the careers of scientific men who reached distinction later."

From "home" in River Forest, the elder Wherry (on furlough to lecture in Princeton) sent his son a book on the missionary movement in India; and his new daughter, the annual report of the Ludhiana medical school for Indian Christian women. Therewith, a letter (May 23, 1907):

I think you will be interested in this work for Indian womanhood. I hope the reading will keep your heart warm for the foreign missionary work. Should the way be possibly opened for the establishment of an Oakland auxiliary to the American committee (see second annual statement inclosed with report), I should be glad if you could work it up.

History does not declare that this opportunity ever came. Wherry himself was busy in different direction. He had resumed his writing; and in the month past presented a paper before the California state medical society. Entitled *Insects and infection* [*16*], it was general in type. Short (twelve pages!) and authoritative, he introduced it in typical fashion: "The title of this long paper was chosen for the sake of brevity." After a recital of the discovery of the various life forms known at the time as involved in the transmission of different diseases, and their classification into intermediate hosts, definitive hosts and mere mechanical carriers of various types of parasite, he ended in a castigation of public health officials. Of their failure to eradicate primary sources and of their neglect to protect food stuffs, he said: "If you will reflect for a moment, many a poor housekeeper is not so culpable as many a board of health which year after year allows piles of horse manure to lie unscreened and so donates to the public an annual visit from one of the plagues of Egypt." Pointing out that California, because of its salubrious climate, was a land in which the diseases of the Orient might flourish if imported, he queried: "May I ask what has been done to determine the

 presence, bionomics and distribution of such insects as might play a rôle in their transmission?"

He had been settled but four months in a flat (2059 Grove street) and to the task of his teaching in Oakland, when San Francisco called upon him for answer to that exact question.

In 1900 that city had discovered herself infested of bubonic plague; and twenty-two had died of the disease. In the next year, thirty more died; and in the next, forty-one. The death curve had then descended. It had reached zero in 1906 just before an earthquake and fire (April 6) overcame the town. Whereafter deaths from plague reappeared and early in 1907 promised a record. Before that year was to end, 156 were to sicken of the disease and 78 to die.

Dr Joseph J Kinyoun, who when forty in 1900 had first recognized the malady, had been promised a lynching for his pains; whereafter he was crowded out of the western scene by Washington command. To take his place in 1903, another member of the U S public health service had been sent in, Rupert Blue. After two years' absence (now forty, since 1892 continuously in the U S public health service, to end its surgeon-general in 1912 and president of the American medical association in 1916), he had returned to his job.

Authoritative handling of the whole situation had never been good. From the first, federal authority had concentrated upon the town, for this kind of sickness was "interstate." But it had not gotten very far. The early dead were chiefly Chinese; and San Francisco's board of health felt that the inhabitants of Chinatown were hers. Later, freight embargoes had been put upon California by her sisters. This threatened the "business" of the state and so state authority had taken a hand—principally to suppress "health" reports considered inimical. Three separate agencies were therefore active at the "management" of a situation obviously in need of concert. To help toward this end Wherry was needed. Thus it was that he was invited to become the bacteriologist to San Francisco's health board; and accepted.

His nomination had come through Dudley Tait, surgeon. The son of a university professor and educated since boyhood in France, he had returned to his birthplace French (just as his brother William, the legal counsel of the state medical board,

had returned from Göttingen, German). In spite of personal success and absence of medical school portfolio, he had retained an enduring interest in medicine's larger problems. Thus he had been chiefly responsible for the formulation of California's medical practice act; and for six years past, as "chairman of the committee on credentials" of the state board of medical examiners, the hangman to see its decrees carried into effect. The result was that men, whether acquainted with him or not, always feared, and either loved or hated him. A common form of salutation among them was: "How is that son-of-a-bitch friend of yours?" He carried a card in his pocket: "In case of sudden and disabling accident, do *not* take me to San Francisco's emergency hospitals." For such reasons brother practitioners wasted no time on him.

Just now he was trying to put better sense into California's health situation, and impressed of the qualifications of the new professor in Oakland's college of medicine hoped, through his appointment, to bring about a surer coördination of the state's plague suppression measures. Wherry's scientific knowledge, made functional by that quiet front of his, worked quickly toward this end, though not, as we shall see, without the production of harness galls.

AS the new bacteriologist, Wherry established himself in San Francisco's pest house. Out of it worked the overalled plague suppressors and into it came daily their game; the tissues, also, of those human victims who had perished of the scourge. The trip across the bay to San Francisco being long, he moved his belongings there (to 936 Lake street).

The day's routine got him quickly to that study of the "presence, bionomics, and distribution" of the "insects" of which he had preached to the doctors. "When acute plague was present in greatest degree" between August and November, he had collected about a thousand fleas. In what he added to this number by February of 1908, he could distinguish [*19*] (in a paper of less than three pages!) six different species that had lived upon almost as many different types of rats. He noted, too, that the degree of infestation varied with the season—against some ninety fleas picked from a single animal

 in September, he could recover but one in May, the beginning of the flea breeding period.

Of the flea catch from men he wrote: "Those from human beings were collected from themselves by medical inspectors visiting plague-infested houses." The drama of this situation, daily repeated, can be clear only to those who know what plague means and the manner of its spread. To be bitten by an infected sample of any of the several types hunted down by Wherry meant the probable death of the unhappy bitee. Thus the wife of one of the inspectors had been sickened. Standing in the middle, Wherry knew all this. After his bath in the morning, he would go to work in clothes plastered with a defense barrage of his own composition—pyrethrum powder mixed with naphthalin. Fellow passengers in the street cars moved away from the animated moth ball. At night he would fly past his wife for another bath and fresh clothes before taking a look at her. Many times would Wherry commend his unbemedalled heroes. Particularly dear to him was his *Diener* of the old school, A Venzke. Wherry had inherited him out of surgeon D H Currie's public health laboratory and was to own him for the rest of his days in this business. He stood daily by Wherry's side—to stretch out the dead rats, to make first necropsy upon them, to make those hair-raising inoculations. A year later in forwarding a dead Norwegian rat to Cincinnati, Venzke called it a specimen that Wherry "had make mit immunity."

More of Wherry's time went into an examination of the rats themselves, brought in by the trappers. Mere statement [*17*] that of the 14,184 rats autopsied to date, one percent had the plague would have sufficed—but Wherry never worked that way. Instead, (in a seven-page paper!) he went into a statistical inquiry of the population levels of their several species (*Mus decumanus* accounted for more than ninety-eight percent), the incidence of plague in each (against one percent in all other varieties, *Mus alexandrinus* showed four), and the biology of their civil warfare. To this he added a description of the pathology and bacteriology of diseases uncovered in rats that looked like plague. Under separate head (a two-page paper!) he reported on one of these in particular [*18*]. He had

unearthed on the West coast, Stefansky's leprosy-like disease. Total experience was summed up in April of 1908 in an address to the California state medical society. To add life to his words he made a demonstration of plague's pathology and bacteriology. This address (a six-page paper!) was not to see print until later [*20*]. For future reference, one sentence needs quoting: "Rabbits and squirrels are susceptible to inoculation but I am unaware of an authentic observation of a natural epizoötic among them."

His catholicity of interest in every aspect of parasitism made for correspondence and friendships with like-minded men elsewhere in the world. At this time two, especially, were of Wherry's circle—C F Baker (itinerant biologist to U S and South American agricultural set-ups) and Henry Baldwin Ward (of the dying race of "zoölogists"; then in the university of Nebraska in Lincoln). What could they contribute to the subject of fleas, the hookworms of cats, the larvæ out of the lungs of rats? Samples were going forward in separate package. Ward (authority in this field) would like some of Wherry's tape worms in exchange for specimens from him. Whereto he added this advice, in March, that Wherry never heeded: "Do not be so damned modest." Ward continued: "Those specimens from a python would be very interesting, and if you have parasites from other animals from the East, or from humans, I should be particularly pleased." Hektoen sent Wherry a receipt for his donation to the Fenger memorial (he could again yield to such financial call) adding in his own handwriting: "Dr Ophüls [pathologist of Lane medical college, newly christened the medical school of Leland Stanford junior university] expresses himself as extremely well pleased with your work. I hope 'they' will give you everything you want." Whereafter he asked: "Have you found any instances of sporotrichosis [it was a main field with Hektoen] in your rats? They would interest me very much."

Wherry's days were full enough, yet the autumn of 1907 filled them further. Over in the Pinole district, some twenty miles north of Oakland, the Selby smelting & lead co maintained a plant. The business of stack fumes killing live stock had come to the ears of the local ranchers and whispers for

 suit were in the air. Wherry's reputation in such matters had been wafted westward by identical wind, wherefore he was approached for opinion. On November 17, 1907, "the worst affected horse on Mr Cochran's ranch" was brought down for his examination. In the presence of authoritative witnesses, Wherry made a thorough job of it. So exhausted by slight exercise that it would not move even when whipped, he shot the animal. Whereafter immediate *post mortem* and two months of preparation of the organs with special emphasis upon the central nervous system (where the effects of arsenic poisoning, if present, are to be discovered)! The animal had succumbed to a lung inflammation caused by microbic infection, Wherry found.

Fearing trouble ahead, he asked his Anaconda friend—McEachran—if he would be available for counsel. Answering that he was now free to go where he wished and that he could be on hand "in the event of a suit being taken," he added this advice (February 3, 1908): "I believe much could be done in gaining the confidence of the people and guiding them aright before any suit is started, otherwise the expenses soon run up into large sums on both sides." Of such better sense was Wherry, too; and because of it, what might have been another Anaconda case, died out. Before this happy ending, however, there occurred an incident which must be recorded.

To keep his report to the company confidential, in part, too, because he never could get used to secretaries, Wherry sent his ten-page account of findings in the horse in personally conducted longhand. E B Braden, vice president, answered (April 10, 1908):

I have your letter enclosing your report on the Corcoran horse [that was to put Wherry straight on family names]. Like all professional men your handwriting is not of the best, but I have had my secretary transcribe it in the best manner possible [all Wherry's *u's* had been typed *n's;* all his *v's, r's*] and I enclose you a copy together with your original, and I would greatly appreciate it if you will kindly go over the copy and make such legible corrections as are necessary. P/S Kindly return papers to this office. [Added note] Dr Wherry: For you. E B B

To write a finis to this tale simultaneously with that out of Wherry's Anaconda days, a sentence is taken from a later letter by McEachran: "So the big suit was squarely fought and honestly won! A strange judgment, won it was, by expert testimony."

BY April of 1908, Wherry's activities as bacteriologist to San Francisco's health board had so effectively commingled with those of the United States public health and marine hospital service that they could not longer be ignored. Also, plague had appeared in California far from San Francisco's shores. Why, was not known; but the need to widen the territory in which plague suppression measures were necessary was obvious. Wherefore the city of Oakland was asked to bestir itself; also, the state's central health council in the capital city, Sacramento. The U S service opened quarters in Oakland and sent John D Long there as chief. (He was thirty-four, a Pennsylvanian, by strange coincidence an A B out of Washington and Jefferson college as was Wherry, at twenty, and an M D three years later out of the state's university; now a passed assistant surgeon, he was in two years to become assistant surgeon-general!). Through his urging Wherry received the following communication from the Treasury department, in Washington:

As recommended by Passed Assistant Surgeon Carroll Fox on the 20th ult . . . you are hereby appointed a temporary acting assistant surgeon in the public health and marine hospital service in the United States for duty in Oakland, California, in connection with the suppression of bubonic plague with compensation at the rate of two hundred dollars ($200.00), beginning April 15, 1908.

Anticipating this new responsibility, Wherry had already moved his scientific belongings back to Oakland. Two one-storeyed shacks in the red-light district that bordered on the city hall had been made over for him into a laboratory. After the entire floor of the one and the middle half of the other had been cleared for animals, a kitchen remained for assignment to Venzke, and a bay window for assignment to Wherry and his

 microscope. To the cognizant the new picture was beautiful. Venzke covered the animal area thickly and daily with new sawdust and brought to rest upon it some hundreds of wire cages, each housing a rat or two—not the white coated, but the sewer trained.

Without the loss of so much as a day, Wherry continued his San Francisco labors. Before long he could write: "Of over 30 000 rats examined . . ." In more public fashion his presence was desired to address the members of Council in Oakland, the town's chamber of commerce and various business organizations. Money was needed, Wherry declared, not only to keep anti-plague measures suppressive but to make them eradicative. He set forth the record of what had been done in San Francisco:

The organization and conduction of an anti-plague sanitary campaign in a city of almost half a million and covering 30 square miles of territory are no small matter. About 1000 men were employed as medical and sanitary inspectors, laborers and rat catchers. Since the main efforts of the campaign were directed against the rat, its destruction and that of its nests and breeding places occupied a prominent place. To this were added sanitary inspections and the installation of tightly covered garbage cans. Over 7000 (human) dead were inspected and all suspicious cases autopsied; about 2000 sick and one million and a half premises were inspected; 11,000 houses were disinfected and 1700 destroyed; over 6,000,000 square feet of concrete flooring was laid in basements and stables and over 2,000,000 rats destroyed by trapping and poisoning.

These measures had reduced morbidity and mortality—more pleasing to business, brought a lift of quarantine against the bay cities. Wherefore, business and politics were for letting down in their subscriptions—and did. Wherry cried: "You have decided to waste what has already been expended and to invite another outbreak." Majority answer to Wherry's argument was a question: "What's in this for you, Doc?"

Wherry fled to his laboratory.

On June 19, 1908, his love for children was satisfied at home when his son was born. The elder Wherry out of India

wrote: "Your baby's grandfather, William Nast, was, in my estimation, one of the greatest men of his age. . . . ;" and expanding in opinion, added: "Children are the greatest of God's gifts in this world aside from the gift of eternal life through Christ, His Son."

Ward, in his world search for parasites, had visited the Wherrys. "How can I thank you both for your splendid treatment of a wandering Swede," he wrote; and reporting out of Seattle where he was, continued (July 16, 1908): "Gave Dr C W Chapin of the U S P H and M H laboratory here your leprosy paper. He thinks he has seen the disease. . . . He does only little work but that very carefully. Rats found dead of plague here last week! They are doing ALMOST NOTHING!!! Some DRS say they never had plague here!!!"

This month of July was a fateful one. Plague in Seattle was to be taken, of course, as just another example of seaport infestation; but what about those inland instances, widely dispersed, in California? Down in the Livermore valley, William Stewart Taylor (sixty) was rounding out a thirty-year devotion to its medical interests. Three generations knew his medicine chest and his surgery; but few men only, his bacteriological laboratory and the depths of his thinking. Pointing to the pitted hillsides as he drove to the sick, he said: "The ground squirrels are dying again as they did three and six years ago. An epidemic is raging among them." And asked what kind, he answered: "It's bubonic plague, for I have rolled over the dead with a stick and seen their buboes."

With Wherry now active in Oakland, Taylor picked up a fresh specimen before its hole on a July morning and, sealing it in a can, dispatched it to him. It arrived of a late afternoon. At six that night Wherry telephoned me that its tissues showed the anatomic lesions of plague and that the smears from them were filled with "enormous numbers of bipolar staining rods." He had made inoculations into rats, various and sundry cultures also, and would report shortly. Three days later came this message: "The cultures show involutional forms and my inoculated rats are sick." When he killed them, he saw again the lesions of plague and recaptured his bacillus in pure culture.

I urged Wherry instantly to make public his findings. He demurred. He was in the army now and needed to report first to his commanding chief in San Francisco. He had written, too, to Ward. In a letter of a date that needs emphasis (August 25, 1908) Ward answered: "I hope you are planning to *publish promptly the results of your examination of the ground squirrel.* The world at large should know the fact. It is of tremendous importance."

Flashed to San Francisco, Wherry's discovery brought orders. Long's Oakland army would proceed to field and shoot all possible ground squirrels. Beginning August 5, 1908, 423 of the animals were brought in. They were accompanied into Wherry's laboratory by a varied assortment of rats, mice, jack rabbits, chickens, gophers, ground owls and coyotes. With one exception all had died in a state of high health, Wherry reported. The exception concerned a squirrel which though plague infected had still been able to walk. Besides it, three more that had been picked up dead, were plague riddled.

Wherry reported these findings, too, to the head office. First public notice of them took strange form. On page 1289 of the *Public Health Reports*—the full title continuing—*issued by the Surgeon-general Public Health and Marine-Hospital Service under the act of Congress granting additional quarantine powers and imposing additional duties upon the Marine-hospital service, approved February 15, 1893 Vol XXIII—Part II Nos 27 to 52 inclusive,* appeared:

> PLAGUE IN GROUND SQUIRRELS
>
> In a communication dated August 28 [!] 1908, Passed Assistant Surgeon Blue, San Francisco, Cal, transmits a full bacteriological report by Passed Assistant Surgeon McCoy on the plague-infected ground squirrel found on the Farias ranch in the northern part of Contra Costa county, August 5, 1908. A case of human plague occurred on this ranch July 11, 1908. (See Public Health Reports, July 31, 1908, page 1096.)
>
> Doctor Blue observes that this is perhaps [!] the first demonstration of the occurrence in nature of bubonic plague in the ground squirrel (*Citellus*

beecheyi) of California. There can be no further doubt, therefore, he writes, that these rodents are an important factor in the dissemination of infection.

Practically the same findings have been obtained by Acting Assistant Surgeon Wherry in the Oakland laboratory, and are reported under date of August 24 [!] 1908. [Italics mine.]

The following is the report, dated August 27 [!] 1908, of Passed Assistant Surgeon McCoy on the examination of the tissue from the squirrel suspected of being infected with plague. . . .

It was to be a long time before the simple fact that Wherry had been the first to prove the existence of plague in the ground squirrel was to be written out in plain English; yet longer before it was to be told that he had thereby explained the appearance of human plague sporadically at inland points, that the west coast was now to be considered an "endemic" source of plague, that plague "prevention" measures were due for a twist.

John D Long saw the point. If not with his connivance, it was at least with his silent consent that Wherry asked me to take a hand in bringing the new crisis in California to more general notice. Not bound, as was he, to the higher authority of federal government (I was a plague inspector by state appointment), I wrote Samuel Hopkins Adams. A chief among the "muckrakers," he was interested. But he was on his way to Europe, and would turn over my letter to Norman Hapgood, then the able editor of *Collier's Weekly*. Hapgood, too, saw the point and after an editorial sent C P Connolly to San Francisco's bay district to investigate. Convinced, he wrote an article for his magazine in the issue of November 9, 1908. Excellent in its statement of the general situation, effective action that might have resulted therefrom was largely blocked—by telegrams received from the mayor of San Francisco, the mayor of Oakland, the commanding officer of the U S public health service in the city by the Golden Gate.

DECEMBER 18, 1908, Wherry's own story [*21*] of *Plague among the ground squirrels of California,* appeared. The manuscript of the "temporarily acting assistant

surgeon" had been received for publication October 26. In accepting it Hektoen had written: "It is needless to say that we are thankful to you for letting us have this fine article." Fine it was—with no mention of the Livermore squirrel and no statement to make clear that gunmen had been sent after the ground squirrels because of it; no mention either of the fact that the catch had been brought to him for primary bacteriological examination. Wherry opened his article by saying:

> The fact that a number of ground squirrels have been proven to be infected with *Bacillus pestis* in two widely separated sections of the state of California is perhaps the most serious feature of the plague situation in America. . . . Hillsides, railroad cuts, river banks, and fields are literally perforated by their complicated systems of subterranean tunnels. . . . The *Arctomyinae* . . . reach from the Atlantic to the Pacific ocean.

An historical sketch of plague as seen in squirrel types elsewhere in the world followed, whereafter a "review of the events" which led to its discovery in California's representative. Here was a rehash of all the terrestrial instances of human plague with careful note of how all the boys who had seen them had guessed their emanation from the ground squirrels. Wherry's discovery had merely freshened their memories. Rupert Blue said: "While investigating the origin of one of the early cases of plague (Bock 1903) . . . I was impressed with the possibility of ground squirrel infection in Contra Costa county." Wherry's article gladly let each man have his glory; outsiders could quite naturally ask: If so prescient in epidemiology why never a suggestion even, regarding squirrel control in eight years?

But seven of Wherry's twenty-three pages went to statement of what he had done; and a goodly part of these centered on praise of passed assistant surgeon D H Currie's (unpublished) laboratory inoculations of plague into ground squirrels and to citation of passed assistant surgeon Geo W McCoy's confirmatory diagnoses. More concerned with epidemiology than with priority, he described how plague, fleas, squirrels, rats and men now, struggled upon a common battlefield.

UNITED STATES.

[Reports to the Surgeon-General, Public Health and Marine-Hospital Service.]

Plague in Ground Squirrels.

In a communication dated August 28, 1908, Passed Assistant Surgeon Blue, San Francisco, Cal., transmits a full bacteriological report by Passed Assistant Surgeon McCoy on the plague-infected ground squirrel found on the Farias ranch in the northern part of Contra Costa County, August 5, 1908. A case of human plague occurred on this ranch July 11, 1908. [See Public Health Reports, July 31, 1908, page 1096.]

Doctor Blue observes that this is perhaps the first demonstration of the occurrence in nature of bubonic plague in the ground squirrel (*Citellus beecheyi*) of California. There can be no further doubt, therefore, he writes, that these rodents are an important factor in the dissemination of infection.

Practically the same findings have been obtained by Acting Assistant Surgeon Wherry in the Oakland laboratory, and are reported under date of August 24, 1908.

The following is the report, dated August 27, 1908, of Passed Assistant Surgeon McCoy on the examination of the tissue from the squirrel suspected of being infected with plague:

WHERRY'S DISCOVERY OF PLAGUE IN
THE GROUND SQUIRREL AS FIRST MADE PUBLIC.
FROM PAGE 1289 OF THE U S PUBLIC HEALTH REPORTS

. . . ground squirrels may act as a host for the *Bacillus pestis* in the interim between the more noticeable outbreaks in rats and men . . . a human having acquired infection during squirrel hunting might reintroduce the infection among rats either in the form of plague-infested squirrel fleas, or by himself, being then the source of infestation for human fleas. The human flea has been found, sometimes in considerable numbers, on rats on both sides of the bay.

Anxious to gain from his new finding more practical help, he related the story of the death of an Oakland sewer worker on the fourth day of a "typhoid-pneumonia." Surgeon Long had been suspicious, and in spite of the threats of a mob, had personally performed necropsy, proved it to be plague, with confirmatory bacteriological diagnosis by Wherry. Members of Oakland's council, faced with these facts, had declared it a "manufactured case," designed to influence them. "It was no fault of the town council that subsequent infection of rats did not occur," Wherry said. They had gotten off so happily because: "Owing to the great sanitary clean-up, human fleas were scarcer in the bay region than they had ever been as far back as native sons could recollect."

To this aspersive dig a footnote in Wherry's article is added in evidence merely of the fairyland in which he ever lived:

The following will illustrate very well how a flea population may once again come into its own in a locality where active sanitary measures are frowned upon. Recently a rat with acute septicemic plague was caught in the basement of a vacant dwelling-house right in the center of Oakland. The house faced the street; it had a vacant building on one side, a Japanese market on the other, and these were surrounded by perfectly filthy shacks occupied by Chinese. The basement was riddled by rat runways and rat droppings could be detected on the first and second floors. It was so heavily infested with fleas that the dust upon the floors could be seen to pulsate with their movements. Four sheets of fly paper were placed on the floor of the basement for one minute and then removed. One of these sheets was speckled with 190 fleas. Another sheet caught 115 fleas; a third about 95 fleas, and the fourth about 75 fleas. The legs of the man [this was Wherry himself!] enter-

ing the house were covered with fleas and he was able to bottle 67 in a short time. . . . As the house had a rat population only, these fleas must have derived their nourishment from rats, and at least one of these was plague infected. It would be simply marvelous if something did not happen with the elements in such favorable conjunction.

PUBLICATION of this article on plague had preceded some others, even though their work had been accomplished earlier. One [22] continued on the leprosy he had unearthed in the rats. Did the house flies that fed on their open lesions (or those of leprosy in human beings) sicken of their bacillary soup; and were they able to carry it away to infect other living objects? The bacilli, he discovered, were taken into the alimentary tracts of the flies, stayed there even if the flies went into pupal form. But he found also that they cleared themselves of this infectious material in two or three days. They did not, themselves, suffer from the disease in the interim, nor did they remain mechanical carriers for very long. Filthy business, the whole of it, but not, in the language of infection, particularly dangerous.

Until Wherry had proved that the ground squirrels, too, of California, were in need of extinction, plague control had centered upon the extermination of the rat. It is at once both the victim of the disease and the host to its fleas. These suck its blood, leaving the dead form once it has grown cold to hop upon the first warm object that comes along. Thus are they able, by biting, to infect it. How to kill the rat constitutes the essence, therefore, of hygienic endeavor. Many schemes to dispose of the rat have been tried—their trapping, their starvation, their poisoning; their subordination to feline overlordship. Each and all are but partially successful. Ideal would be the spread of an infection among them, which while killing the rat would not kill associated living forms. It had been tried before. While dissecting some of his dead guinea pigs (rodents, too) Wherry had unearthed an organism responsible for the abscesses in their spleens and livers [24]. It was identical with one that Theobald Smith had described ten years before. The two had much correspondence on the subject. Wherry had

 found it related to the germ of hog cholera and christened it the *Bacillus cholera-caviæ*. He sent cultures to Theobald Smith. "They were received in perfect condition; also the notes pertaining thereto," said Smith. Less than a month later he wrote further (November 2, 1908): "You are quite right to give this organism a name, for you have found a use for it which I hope will prove of permanent value. *B pestis-caviæ* might be better since the disease may appear as multiple spleen & liver abscesses or as a puerperal disease." The newer name was to endure. As to the "use for it," this lay in its effectiveness as a death dealing disease if fed to rats [*24*]. It was acutely fatal to their young (and to mice), Wherry found; but not to adults, a large percentage of which was naturally immune or recovered if successfully sickened.

Wherry lived in the large blue heaven of parasitism as absolutely as did the great Smith himself. On this account another letter from Smith out of the period (written from Lynton, Devonshire, July 18, 1909) needs quotation:

The relation of *B caviæ* to the other members of the para-colon group I shall not be able to approach. Your own information by this time is more comprehensive than mine. I think that the only way to find out relationships is to infect other species, as you are doing and attempt by passages (of feeding) to adapt one to another host. We cannot tell how plastic these varieties are or how adaptable until we have tried to modify them. The experiment is still the only clue.

In a further paper [*23*] by Wherry, yet another disease in rats was described—an infection with a diplococcus resembling that of epidemic meningitis. By itself it was just the discovery of another organism. More important in Wherry's eyes was its variation in growth characteristics. The paired micrococci grew out as chains when cultivated artificially, to revert to the diplococcal form when inoculated into animals.

His work on rat leprosy got Walter R Brinckerhoff, in charge of the leprosy investigation station at Molokai (T H) excited. "The rats arrived all right on the *Alameda*," Brinckerhoff reported (August 1908) and "I am obliged for the very complete notes . . . It seemed like old times to get hold of such a business-like collection of data." More letters

passed between the two until a request three pages long at Christmas asked Wherry to join the leprosy staff in Honolulu at three thousand. "I don't want assistants but men capable of working on their own," Brinckerhoff wrote. The tropics, leprosy, the serum investigation of disease, were items very close to Wherry's heart. But he was already under army rule, had been before, and was gun-shy. Brinckerhoff wrote, "If at any time you change your mind, let me know."

Mother in India kept Wherry informed of their daily life: "A young Hindu has just come to call your father to a temperance meeting . . . " Father had forgotten the appointment. Mother explained: "Old age, you see!" Whereafter she wished statistics on the California plague situation, adding her own on the situation in India. Then this more distinctly family inquiry: "Have you still with you the woman who can cook curry and pilau for you?" It referred to "Auntie" Boyle, English born, India raised, now resident of California and the nurse to Marie and her baby. The father harbingered: "We have good news from Aunt Sarah, who is busy in the villages telling the women of Jesus and His love."

Wherry's studies brought him much praise. Ward sent eulogy every week. "I have read three times about the rat's liver and its nodules," he said. McEachran told him of his "admirable reports" on the squirrels and the leprosy in rats, adding that Dr Montezambert (chief health officer for Canada) had "appreciated them very much." Wherry's admired fighter of Bombay, W B Bannerman (chief of the Indian plague commission), home on furlough wrote from Edinburgh: "I wonder if the rat leprosy has any relation to the human kind; such a thought suggests ideas!" Smith sent word: "The relation of plague to the native rodents appears to be a formidable one. I am hoping that in passing thro' and adapting themselves to these rodents they will equally lose their virulence for man. Let us hope so for our country's sake." Howard T Ricketts, fresh from his victories on Rocky Mountain spotted fever, said: "Splendid, your work on plague; wish I could have had a share in it."

Wherry stood in need of cheer from such finite sources. His own school, those in San Francisco, and business scarcely knew

 what it was all about; and the colleagues in uniform thought sufficient the presentation at women's club teas of the claims of one garbage cover manufacturer over another. Wherefore, news from the medical department of Nebraska's university (part in Lincoln, part in Omaha) of what it was doing enthused him. Ward had been joined by Woolley, finished with his contract in Siam and with an Order of the white elephant on his chest. Arthur D Dunn (professor of medicine in Creighton) had placed him in the professorship for pathology in the rival school. "Hurrah! A letter from Bill. *Arigato gozaimas,*" Woolley wrote. The crowd there was going good. "Secure for me some skins of the ground squirrel and forward," Ward commanded. In acknowledging them and the simultaneous receipt of pathological specimens, photographs and flea sets, he exclaimed: "Splendid! . . . What can I send you of half such interest and as reasonable return?" A late addition had come into this group—Creighton Wellman. Missourian, thirty-four, he was just returned from Portuguese West Africa with a past, many writings and a startling collection of *Coleoptera.* He was lecturing on the relation of tropical diseases to temperate climes but needed more fixed employment.

Wherry invited him to talk in Oakland. (Ward had warned: "Such a man should not be asked to travel long distances and offer his services to institutions or societies in return for a vote of thanks.") Thereafter Wherry succeeded quickly in making Wellman the new professor of tropical medicine in the Oakland school. This start, pushed further, would have established a school for tropical medicine where most logically it belonged. Even Ward was a possibility: "If you know a man who would give money, if only a little indeed, for a research laboratory and let me get free from this abominable legislative work, I should welcome the chance." But the west coast knew only the East and Western Europe, not Cathay.

Wherry expressed his feelings when he read *Leviticus* to the doctors of his state in April. *The plague situation in America* was never printed:

. . . plague, like cholera, has its *endemic centers,* starting from which it spreads in epidemic form at shorter or longer intervals. One of these is situated on the northern declivity

of the Himalayas; another in the adjacent Chinese province of Yünnan; a third in southeastern Siberia in the Lake Baikal region north of Mongolia where the disease is endemic among rodents resembling our ground hog and known as "tarbagans." Another center lies in Mesopotamia and in 1898 Robert Koch found one in Africa's interior, probably Uganda. Now we add a final spot—the state of California.

. . . early races, even, saw a connection between rats and the spread of human plague. In 1894, in Canton, preceding the outbreak among men, rats ran over the streets in shoals and died in large numbers. In one district over 35000 dead rats were collected in a day. . . .

The history of plague in America is worth reading from a political and sociological standpoint as well as from the medical. . . . Every effort was made by local and state authority and the business interests to conceal the facts. . . .

The almost annual recrudescence of plague in San Francisco has been a mystery. Answer to the question was found when, in August 1908 I discovered that the ground squirrels in the counties bordering the Bay of San Francisco were infected with plague and that they had died in large numbers of plague in the past few years. . . . in at least five counties across the bay from San Francisco, one percent of the squirrels are infected. Several cases have occurred in men hunting these squirrels. Another appeared in August, 1908, in Los Angeles—showing that plague is much more widely scattered in California than generally believed. . . .

State laws were passed forbidding the transportation of ground squirrels and their sale. These rodents are considered a great delicacy—though personally I prefer the smell of a rat.

Do you think that the law-abiding nature of the American makes him obey this law? Not at all! Hundreds of hunters shoot squirrels on Sundays and cart them into town. It may cheer you to know that the only cases of human plague which have occurred during the past year have been among these squirrel hunters. They come from that ignorant and yet sophisticated class you all know. They do not believe that plague exists. The Oakland *Tribune* says that the plague scare is a game of medical graft; and the hunters believe all they

plague in San Francisco has been a mystery. Where did the infection come from? Was it brought in by ship rats from the Orient each year, or did plague remain latent among the rats during the winter months and then light up again during the flea season?

The most probable answer to this question was found when, in August 1908 ~~WE~~ I discovered that the ground squirrels in the counties bordering the Bay of San Francisco were infected with plague and that they had died in large numbers of plague in the

A SHEET OF MANUSCRIPT (1909).
NOTE CHANGE OF EDITORIAL *WE* TO *I*

read in the *Tribune*. They have hunted squirrels for years without getting sick and like the homeopaths or Christian scientists are in the state of mind of the Armored Armadillo—corrugated, convoluted, hornified and impenetrable to common sense. If only there were a Providence to supervise the proper distribution of the plague bacillus! Unfortunately it most commonly attacks the poor who must live in misery; or the strong and active whose occupation brings them into contact with rats—street loafers and idiots are immune. Among the latter I mention town councilmen. Much against my wishes plague did not decimate Oakland's council.

The situation in my opinion is extremely grave, for plague among ground squirrels means that we have an endemic focus in America. . . . Wherefore not only California will suffer from time to time from plague, but the danger of its extension to neighboring states and eastward will persist.

IN July of 1909, Wherry sent his family to Mill Valley for a rest; and needing one himself had followed for a week-end. On August ninth he returned and at the door of my flat, pulled a yellow sheet from his pocket:

On nomination of Dr Woolley will you take position bacteriologist in department pathology in reorganized Ohio-Miami medical college of the university of Cincinnati salary eighteen hundred with expectation of advance in nineteen eleven. Charles Wm Dabney

"What will you do?" I asked. There was no smile in his answer: "I'm going," he replied.

VII

FUNDAMENTALLY, Wherry had bought a pig in a poke. The old medical circus that was Cincinnati had ordered a new top in the year gone by, which had made every medical employee in the U S jittery and hopeful. Daniel Drake's grand school had forgiven its erring son (also some half dozen illegitimate children found in the snow) and all were to live happily together once more as the medical arm of the town's great and growing university. At least four major chairs were to be made "scientific." Wherry had heard of these possibilities a full year before receiving Dabney's telegram and since his wife had come from Cincinnati, she undertook a writing to some of the distant cousins in Wherry's behalf. There was nothing doing. Medical salvation flowed from the side of Johns Hopkins, sometimes Harvard. So Woolley had been brought in. It was his urging that had nominated Wherry as the assistant professor for bacteriology. Dabney described the Cincinnati situation in detail (August 10, 1909):

. . . our new medical college, recently formed by the fusion of the two old medical colleges, the Ohio and the Miami of this city. Both institutions gave up to us [the university of Cincinnati] their charters, good will, properties, moneys, etc —everything in fact—and all members of their faculties resigned, placing themselves entirely in our hands for reorganization. The new faculty was then appointed in June last as shown in the catalogue. We are still looking for a professional educator for dean . . . the new city hospital . . . which will cost over four millions of dollars includes a great laboratory for pathology and bacteriology. The university will have control of all its medical and scientific work and it will thus become, for all purposes, the university hospital, though supported by the city at a cost of about one half mil-

 lion a year, not charged to us . . . The hospital will make the college.

The business of being only an assistant professor did not disturb Wherry. He did, however, want assurance that time would be available for independent thinking, and a salary equivalent to what he had in his western job. " . . . assure me of several hours a day free for research . . . and financial support at least equal to what I am getting here. All work done outside, to reinforce one's finances, endangers one's teaching and research." August 14, 1909 the president of the university telegraphed:

All right will appoint you assistant professor bacteriology with Woolley and bacteriologist to city hospital at 2400 yearly time for research announce this appointment immediately in effect September first expect you soon as convenient.

Wherry broke camp at once and on September 15 arrived in Cincinnati. Though a bit late for the newly opened medical session, he quickly caught up. As he had written the president: "I do not anticipate any difficulty in getting ready as I am bringing much material which can be used for teaching purposes." Much it was—a regular zoo. Letters of congratulation—and of sorrow—lay thick on his desk. Hektoen (August 28, 1909) wrote: "I hope very much that things there will develop as planned . . . I wish you the fullest success in creating a new centre of bacteriologic science. I am so free as to state that you merit a higher place on the academic ladder than the one announced and look for your speedy promotion . . . All your friends agree that Cincinnati is fortunate in getting you." H Gideon Wells (who had refused the Woolley place) wrote: " . . . the facilities for medical education and research that the new hospital will offer constitute the best field in the U S; and I am glad you will have a chance at it."

Wherry sent some of these letters to his father who November 3, 1909, answered: "I return these testimonials & would say, keep them—they may be of use to you some day." (The old gentleman never did get clear that pull is better than push in university life; and friendship than merit!)

Sadder notes came out of a bereaved west. Ricketts inquired: "Why didn't they ask you to Stanford?" and Geo W McCoy ventured: "I never get tired of rubbing it into the two universities here for letting you get away." Venzke's Ger-manic depression put him in hospital. A report stated: "He is suffering from the well-known nervous manifestations of subacute poisoning with ethyl hydroxide."

After two weeks in Cincinnati Wherry could write a complete description of the place (September 29, 1909):

. . . Now that I have gotten over the shock which the dirt of Cinti gives me, and have grown accustomed to seeing Billie look like a coal-heaver, and have indefinitely postponed getting another glimpse of Mt Tamalpais, and have resigned myself to the separation from Oakland—perhaps I can give you a fair idea of what there is here.

The medical college building is a pippin, sticking right out of the side of a hill. Say, it's 100 feet to the side and four stories high—brick—large and small rooms with high ceilings, and in its general appearance reminds me of Rush. Histology and embryology labs in basement; physiology lab, lecture amphitheater & office on first floor; pathology and bacteriology on second floor. I don't remember the third floor but on the fourth are the laboratory for physiological chemistry and the dissecting room. The building was in bad shape but they have done much to improve it and it will do until they get into their new buildings perhaps two or three years from now. A second part of the work is given on the university grounds and a third part at the city and Good Samaritan hospitals. The city hospital reminds me of [Chicago's] Cook county and smells just like it. Since most of the inhabitants are crazy Dutchmen there is no difficulty about posting every case that dies. There is a large clinic building attended by hundreds of patients in direct connection with the college and situated within 200 feet of it. The equipment is really ample for teaching purposes; and so far as research goes, Woolley and I will do all our work at the city hospital lab.

The men have received us in a most generous spirit and while no doubt there are some hard feelings as a result of the merger, all appears smooth on top. President Dabney is a

 fine man and a big man and has broad plans. He is keen on teaching the preliminaries from a scientific standpoint.

By the way, a couple of days after I arrived, Lyon [Elias Potter, forty-two, physiologist to St Louis university medical school, not an M D, but among the most, if not the most potent voice in American medical educational reform] appeared—this may be a secret so keep it. They are thinking of him for dean. He looked things over but I don't know with what result. Baehr [Edmund Michael, thirty-one, self-taught collegian, the voice of Kraepelin, Freud and Sherrington in Cincinnati] who now teaches physiology here, is an awfully nice young fellow with a very level head but is in the practice of medicine and I imagine no more of a physiologist than our instructor was at Rush. I wish we could get a chair of medical entomology established and have Wellman but I am going to get a good line on things before broaching the subject.

I could not find a fit place in Cinti at $30–$40 per, so looked into Fort Thomas, Ky, and fell in love with it. Now we have a beautifully situated, 7 room California bungalow —a perfect dream—but it will cost $40 per. Everything is as dear here as in California, so don't be deluded about the cheapness of living east.

Wherry did the work of his heart in the crumbling ruins of Cincinnati's onetime glorious city hospital by the side of the canal on Twelfth street. World travellers got it mixed in their minds with Vienna's *Allgemeines Krankenhaus*, with a storey added. Inside, both could boast the same courts, cockroaches and calluses. Undergraduate bacteriological teaching lay a mile distant, in that "pippin" on the hill—McMicken's original "college" from which had hatched the university of Cincinnati. A "written quiz" here December first permitted him free time for correspondence. He wanted direct news of "Auntie Boyle" in California who had so often satisfied his hunger for "cully-lice." Whereafter he continued: "To-night we celebrate the merger of the medical colleges by a function. If I can get into my dress suit, I'll go. Adios! The hour is up."

The Christmas weeks were rather full. His second child, a daughter, was born—and Marie had not been well.

By January 13, 1910 he again had heart to take pen in hand.

It was to elaborate upon a telegram sent me earlier, and in his own name, to visit Cincinnati. He had suggested my consideration as physiologist. "Woolley and I have been operating on Dabney (on the part of the university) and Forchheimer (on the part of the medical faculty) to get busy and fill this chair . . . Dabney visited the east . . . I judge that the remarks were not in your favor."

For myself, I was not particularly interested, for Freer of the Philippine service had passed through California. I had accepted the chair for pathology in the Manila school and was awaiting sailing orders. But attack upon the character of one of his friends was more than Wherry would ever stand. Having continued "operation" in Cincinnati, he sent me a telegram (January 20, 1910) that made me his colleague: "Full professorship free field come and see us without abandoning other position." It was after this visit to "see" and to "lecture" that my appointment followed and he wrote (February 22, 1910):

I use ruled paper because it *is easier* to write in a straight line. The note you dropped out of the train was finally picked up and arrived the other day telling us that you were safely on your way back. I felt quite relieved—not that I think that this is such a wicked world, but you *are* so young. In spite of that, however, most of the men seem delighted with the news of your appointment. I have not told them that you might come before September but think that if you can arrange it, it would be a good stunt to get settled and get some research started, though they say it is as hot as Hades in Cinti in the summertime. . . . I have started some work on the effects of acids, bases & salts on bacteria—have only just gotten some standard solutions made up—and am going to work first with the cholera spirillum owing to its great susceptibility to the H ion. By the way, I spotted a case of amœbic dysentery the other day—in a physician's wife—undiagnosed for eight months and apparently contracted here. If I can only find a few more examples of tropical disease perhaps we can get Wellman, too. I do hope Stanford doesn't make an ass of itself by letting him get away from the coast, for that is the place for a school.

SOME other items absorbed the time of Wherry's first months in Cincinnati. Howard T Ricketts, victorious but exhausted by his studies of Rocky Mountain spotted fever (in the past three years he had transmitted it to animals, first by the blood, then by the bite of a tick, finally by the injection of a small bacillus he had discovered in human instances where the mortality goes as high as ninety percent) wrote (August 12, 1909): "Confidentially, I am thinking of taking up typhus fever." He needed "more intimate acquaintance with the insects" and wanted Wherry's help. "This is a nervy request and rebuff from you would be considered proper." December 20 he was in Mexico thanking Wherry for a fine "bunch" of references, monographs and reprints unobtainable "even in the U of C. Things took a very sudden turn and I came down here," he continued. "Shall write you later about doings. A hot mixup. Three parties at work and a fourth one expected." (What this referred to was a competitive excursion by four different "research" agencies all better equipped financially than Ricketts. He had not been allowed time to recover from the fatigue of his Montana sojourn, typhus struck his wearied body, and he died [thirty-nine, in the City of Mexico, May 3, 1910].) Whereafter he returned to a more personal theme. "When your name is mentioned in Chicago, it is with regret that you are not still there. It's all their fault, and a great mistake to let you go."

Distance, of course, had made it impossible for mother in India to attend the birth of her granddaughter in Cincinnati; besides which other things in the compound at home had come up. She wrote (January 11, 1910):

We were in the midst of Genl Assem . . . The Presbyterian church of India honored your father by electing him moderator & everyone was so pleased with the way in which he conducted the business. We had 22 people at our table for five days—3 meals a day & afternoon tea. Your Aunt Sarah helped me but I gave clear out on the 3rd day & had to go to bed . . .

We have had some sad cases in our Mission. Lucy came out to her parents, arriving in Dehra two days before Christmas. Her brother paid her way. About two or three days after Xmas, they sent a telegram to your father asking the Assem-

bly to pray for her, as she had "acute mania." Miss Mitchell who was here went right off thinking she might be able to help, & as *I* thought it must be a mistake in the telegram, she wrote at once saying it was really acute mania & not pneumonia as I had hoped. They have to feed her some way through the nose. . . .

Then a few days before the Assem opened, your father got a telegram addressed to the Senior Missy here, telling him of Dr M's severe illness at Subathu. It was from the Civil Surgeon there, saying that he needed care at once, his family being in America. After talking together about it, Dr Fife said he would go—so he went and brought Dr M down to this place. It seems he was poisoned two years ago in performing an operation on a man for a bad disease, & he took treatment for a year, but was told he should take it for 2 yrs, however he didn't, so now there seems to be danger of an abscess on the brain. He sees double and his mind is not clear. . . . Doctors must run awful risks when they perform these dirty operations!

Please give us your *real* address. Will said you had taken a house at St Thomas, Ky . . . I am inclosing some clippings to show you that India is still in *un*rest. The disloyalty of the Arya Somajists is being found out and the young Rajah who has just come into power is helping to bring to justice all Anarchists &c. Mr Warburton, Chief of Police, is his right hand man in detecting & punishing all offenders. Mr W used to be here in your time, Will. Mr Jackson was killed because he was an English official, and every now & again a bomb is sent to, or thrown at some one, as in the case of the Deputy Commissioner at Ambala. . . . The professions of some of the Hindus, at being disgusted with acts of murder &c are mere hollow shams to hide their own disloyalty, and the palaver of the Mohammedans every one knows is, because they hate the Hindus *worse* than the English. We do not see trouble, therefore do not fear it, tho' the bomb at Ambala comes pretty close to home. P S The Missionaries here each entertained guests at Genl Assem time, & there were many Indians provided for at a separate table & cheaper than the European table. We had 5 very nice Indians at our table.

Out of San Francisco and Oakland, Wherry's one-time colleagues continued to plaster him with letters of regret. What he wanted more were the rats he had left behind, inoculated with leprosy. Geo W McCoy promised (January 18, 1910): "I will see that they are forwarded right away, . . . it seems to me that there might be some danger of their dying in the long cold trip back to the barbarous East. . . ."

The chief of the *Institute for the research of infectious diseases in Tokyo,* the great S Kitasato (co-worker with von Behring in the discovery of diphtheria antitoxine), had been stirred by Wherry's leprosy studies. January 24, 1910 he asked: ". . . send ten white rats newly inoculated with your bacilli. I have asked the Toyo Kisen Kaisha to carry them aboard its ship to Japan. . . . Ask the agent of the Toyo Kisen Kaisha to carry them to me. All the expenses will be paid as soon as your accounts arrive. Thanking you in advance for the great trouble incurred upon you . . ."

Wherry delegated this request to McCoy who reported (March 9, 1910) that a telephone communication from the Toyo Kisen Kaisha had declared it willing to take the rats only after assurance from him that there was "no danger to the ship. I will send them as soon as I can," he continued, "but leprosy rats have grown pretty scarce in Butchertown."

Return is now made to some other letters of McCoy, each of which reported autopsy findings in rats that had died, inoculated with leprosy. In his original paper on the subject Wherry had declared: "Owing to accident, my wild rat and guinea pig inoculation experiments were failures." McCoy's reports showed that all Wherry's subsequent inoculations had been successful, that, in other words, the leprosy had been transmitted to rats and that it had spread into their bodies from the site of original inoculation. Since these findings were never published, two of McCoy's reports are quoted *in extenso:*

Rat No 1: Died February 26, 1910; an infiltration 6 cm long by 2 cm wide, over the front middle of the abdomen, yellowish, granular and entirely characteristic of rat leprosy; smears filled with acid-fast bacilli; the inguinal glands a little

enlarged and smears show a few bacilli; internal organs negative.

Rat No. 2: Died April 28, 1910 [the last of Wherry's series]; an ulcer the size of a dime directly between the sternum and pubis, at probable site of inoculation, infiltration around this lesion covers an area about the size of a twenty-five cent piece; large numbers of acid-fast bacilli in smears from this location; axillary and inguinal glands moderately enlarged, with smears showing the presence of a few acid-fast bacilli; no other lesions.

To these scientific reports were added data on West coast epidemiology that must have given Wherry some unexpressed, warm feelings inside. February 28, 1910, McCoy wrote: "Found a plague infected squirrel in San Luis Obispo county, a few days ago. This county is just about half way between Los Angeles and San Francisco and on the coast." March 9, 1910 he added: "We are getting a good many plague squirrels just outside of Berkeley now. They may represent the same focus that you struck nearly a year ago, although some of those that we have gotten have been found much nearer Berkeley than those found by the men when you had charge over there." And June 6, 1910, he said: "We are finding additional counties that are infested and goodness only knows where it will end."

WITH the spring, discussion of material available for the newly wanted dean of Cincinnati's medical school and for a "full-time" professor of anatomy grew more active. Lyon had been proffered the former job; and refused. Now Wherry proposed that Dudley Tait of San Francisco be considered for both posts. Anatomy in the medical schools, Wherry believed, had gone too "scientific" and it was time to give it a more "surgical" or "applied" twist. Tait had reputation both in surgery and medical education; and would be ideal. Dabney was convinced. When first broached on the subject, Tait had, however, declined. Wherry wrote about this and some other things, March 28, 1910:

Judging from a telephone message I had from Dr Dabney yesterday I suppose that Tait definitely refused. I am sorry.

He would have been a dandy man for the place. Sometimes I wonder though whether he would have liked to wait for the developments which are planned. In many ways the school is pretty crude as things stand. . . .

Now about inviting the Amer Assoc of Pathologists and Bacteriologists here for next year. I talked the matter over with Woolley again to-day and he does not feel that we could show them a good time here just yet; in a couple of years or so things will be on a different footing. Then, do you realize that *May* is as hot as Hell here with no place to go but out, and nothing to see but breweries?

I stopped my experiments on the effects of acids & salts etc on bacteria as things became very strenuous but will continue them soon. Just at present I am trying to cure animals infected with *Tr brucei.* It is terrible to get an idea into your head so strongly that nothing but a series of hard work experiments will serve to knock it out.—Well, I must close and answer some silly questions in bacteriology asked by a gentleman from Indiana.

Tait's refusal was not as "definite" as Wherry's letter had indicated. Actually three more months went into correspondence between the principals. At one time Wherry wrote me:

Pres Dabney invited me down to talk over Tait. The politics of these things are too much for me. If you are still in Chgo and will come down, stay with us in the country where the blossom-perfumed breezes blow.

April 22, 1910, Wherry was still hopeful:

I'm very glad to hear that Tait is going to visit us. I firmly believe him the man we need here and have told Dabney so, though I have avoided trying to persuade the President in his particular favor as there seems to be some feeling among the local men that we are trying to get a clique together—which of course is all bosh. . . . Naturally, Dabney has heard that Tait is strong headed & speaks his mind freely & so seems to fear that Tait might not have the patience to wait for the developments he (Dab) has planned & which he feels will surely come though slowly. . . . I am in a hurry just now, so adios!

A few weeks later, Wherry had heard of my desire to bring with me, at a small salary, a research slave out of Oakland. He had also heard that physiology in Cincinnati had no money for such purpose. Said Wherry (June 10, 1910):

. . . If Pres Dabney cannot find the money to place the suggested assistant in your department, nominate him for pathology, let us pay the bill, and use him in physiology. I have spoken to Woolley about this . . . Now as to the reason why I have not written for so long: I have been working like the devil on some cases of pernicious anemia that Dr Forchheimer got for me, and on one fatal case we posted at the hospital. Of course my work is on etiology from the infectious point of view. I have argued thus:

1 Repeated injections, continued over a long period of time, of a hemolytic agent, *e g* ricin, produces the anatomic and physiologic picture of pernicious anemia.
2 The toxine (?) of *Bothriocephalus latus* absorbed from the intestinal tract produces the picture of so-called "cryptogenetic" pernicious anemia in a considerable percentage of cases.

Might it not be possible that these "cryptogenetic" cases are due to hemolysin produced by some microörganism in the intestinal tract—bacterial or protozoan? I have been looking for *everything* and have collected and compared a mass of stained preparations and cultures. You can imagine that I was somewhat excited when the contents of the ileum and colon (from the fatal case) when plated in agar mixed with defibrinated rabbit's blood, showed the presence of a very large percentage of bacteria whose colonies were surrounded by a wide zone of hemolysis.

However, I am beginning to cool off, now that I have studied some normal controls and cases other than pernicious anemia. But I still hope to find some specific differences. In any case, I will have learned something about the hemolyzers of the intestinal tract. I have no intelligent assistance whatever and the preparation of media etc takes much time. Most of the young fellows are afraid to stick to anything so time-consuming as bacteriology.

As you will see from the paper I send along, Dabney got

his nerve up and did some real reorganizing, but has not yet found a dean. I tried to make an appointment with him several times but failed; and the last time I called up he was out, but saw Woolley the same evening and asked what I wanted. Woolley told him I wanted to know how the Tait affair stood. He said that Dr Tait had definitely turned us down and then went on to tell Woolley how he thought that we (Woolley & I) had better not get mixed up in the dean affair as there was already some dissatisfaction about our activity in the matter. . . .

By the way, Wellman has probably told you of the work on *Treatment,* Forchheimer is editing. . . . Tell him that I want his dope on the writers for tropical diseases.

P S Forchheimer asks me to keep the knowledge of this new work of his Q T. How about the can-can at St Louis?—"Rotten if true."

By middle June the Tait matter was finished. He declared himself "inadequate;" also, he had suffered a heart attack—first onslaught from without that ever put fear in him. Woolley was made dean, and Henry McElderry Knower (long left on the shelf at Hopkins with Ross Harrison) the anatomist.

Politics in the university were rather foul. A secret ballot, it was said, indicated that its board of directors was standing five to four against Dabney's continuance in office; and more newspaper print spoke of university authority as desirous of closing the medical school—the student registration had dropped down, resignations after the amalgamation had made sore hearts, the town doctors did not like the medical professors, etc. Wherry wrote from his laboratory (July 27, 1910):

I hate to hurry on this humid, hot morning but I want to send you this clipping from the morning's *Enquirer* which will interest you, though I think any talk of closing is rot. When do you start for Cinti? It is hot as hell here now but will be just as bad in September. . . . We are over in Avondale for a few days at Aunt Fannie's [Francesca Nast Gamble, Marie's aunt, who had grown up with Ivory soap and put a million of the proceeds into China's Methodist missions alone]. She wants us to take her cottage at Lakeside (on Lake Erie) but the milk problem up there is not an easy one &, then, I don't see how we

can afford it. I made some on the side, but most of the men never paid up. We have plenty to live on at home, so don't get out your handkerchief—only, I mean, I don't care to spend half a hundred extra just now.—I have not found the cause of pernicious anemia *yet*. The climate reminds me of Colombo.

The newly headed departments that now comprised the two first years in Cincinnati's renovated medical school got off to a good start when the autumn semester opened. The chiefs had shown good sense in leaving the personnel of their various divisions untouched—no men in any of them had been dismissed, and where some had resigned, they had been brought back. Thus the academic half of the school could now boast some thirty men—Knower was forty and the old man of the lot—at once young, friends, enthusiastic and medically sanguine. Wherry was happy. He wrote of the situation to his mother who replied: "It must be very nice indeed for so many of you young fellow-student doctors to be working in the same place."

AS Wherry was thus seeing to a close his first year in Cincinnati, more of what he had done in California came into print.

Poet that he was, he had asked early in the season why plague as he knew it, was no longer as hemorrhagic as in the Middle Ages, when men bled so that it was called the Black-death. "The social misery of the fourteenth century was accompanied by the prevalence of scurvy, a disease which might well contribute to the degree of hemorrhage which occurs in the normal individual," he wrote. And so in a (six-page!) paper [25] he told of guinea pigs made scurvic by bad feeding, inoculated with nonkilling strains of plague, which showed more blood than controls decently fed. That was the answer to his scientific query; but in getting it Wherry had recognized and drawn upon work little known then, forgotten now—the important discoveries of Axtel Holst and Theodor Frölich who in trying to explain ship beri-beri and scurvy had pointed out the horrors of all "one-sided" diets (the common lot of man in the breakfast food period, and of the domesticated animals throughout time). Vitamines, cabbage and fat

 reputations were to come to science later, but here was the truth in 1907. Wherry saw the tragedy in the dumb martyrs about him. "My laboratory animals," he wrote, "stock guinea pigs dead of general anasarca with muscular hemorrhages . . . no bacteria . . . guinea pigs with scurvy." How often before (and since) had they not gone down in the records of scientific research as the victims of this or that experimental endeavor when thoughtlessness or just crass ignorance of fundamental dietary rules was the real answer!

There was further report on rat leprosy [*26*]. He had tried to protect both white and gray rats against the disease by first "vaccinating" them by the injection of dead organisms. Such treatment, he said, did not materially affect the outcome when subsequently inoculated with live organisms, even though in one of his ever modest addenda he spoke of the "marked" delay in development of disease symptoms in two of his animals over the controls. Then he detailed a tricky way of getting leprosy bacilli "concentrated." He ground up leprosy affected tissues in salt water, covered the mixture with chloroform and shook it. The chloroform grew cloudy, and evaporation of a drop of it showed "millions" of lepra bacilli "free from all cellular elements and other bacteria." To finish this essay, he added notes on six lice that he had taken from a severely leprous rat. He had ground them up, stained the mess, to find hundreds of the bacilli in their intestinal tracts—thus leaving something more for the epidemiologist to worry about.

1909 closed with a description of the "first case of undoubted squirrel plague in man which has come to autopsy in America" [*28*]. A (six-page!) paper detailed its manifestations in a thirteen-year-old Portuguese boy who had been shooting ground squirrels near Niles (Dr W S Taylor's district) in California. He had never been away from this inland home—had never, in fact, seen a trolley car—so probability that he had incurred the disease while visiting a water front was obviously out. And anyway, no human or rat plague had been seen in California for seven months past. But a plague infected squirrel had been found in the region where the boy hunted. He had sickened July 27, 1909. The next day there was fever (104°); and enlarged axillary glands appeared. In another twenty-four hours he was on his way to a hospital in

Oakland where the glands were cut out; but not examined. Now the rest of his lymphatics swelled up but it was five days before anybody suspected plague. Wherry was called and in a newly excised gland found a lot of his pets, grew them out in glass tubes and scratched them into guinea pigs and rats—to make them die. The boy himself developed pustules all over his body on the tenth day; and these showed plague bacilli. Thus, on the sixteenth day of his disease he entered eternity.

Autopsy showed, besides the generally poisonous effects of acute infection, "bubonic, lobular pneumonic and pyemic plague." The combination was new, for plague is usually content to express itself in but one of these ways. The crystal gazers now said that Wherry's description was what they had always recognized as squirrel plague. Wherry stated: "We have never seen lesions of the same nature in any other case of human plague; in fact, without knowledge of the previous history of the case one would scarcely have suspected plague infection at autopsy."

He completed his literary year by describing with Wellman (still in the Oakland college in California but soon to head tropical diseases at Tulane) various external [*27*] and internal [*32*] parasites of that now so important ground squirrel. In June, July and August, it was written, they carried a lot of bedbug like creatures in their ruffs; and in all seasons of the year another lot of protozoa, worms and mites in their little insides.

Free for a moment of the chains that bind the man of science too closely to his shop, he made a general address to the medical teachers of his newly adopted state [*31*]. "The chief function of a medical school is to turn out competent practitioners," he said. "Have the methods of instruction used in the past yielded the ideal practitioner?" By no means, he thought, with half their diagnoses proved wrong on the autopsy table. The student had what Oliver Wendell Holmes called a "natural incapacity for sound observation," and it was the purpose of the medical teacher to train this out of him. His best way lay in the use of that best of his tools, the laboratory. "We fail to apply the laboratory method to the so-called practical branches" of medicine, Wherry said.

IN late September (1910) mother wrote of the rather terrifying political situation in India; and added some statistics on the health: "A teacher died of cholera at Edgehill, then a nurse and several servants." Receipt of this information coincided with that of a personal note from Wherry's adored coworker, J D Long, now assistant surgeon-general U S P H & M H service in Washington. Cholera was a more generalized world menace. Would Wherry be of his private list for call, in case the sporadic cases that had passed the U S borders got out of hand? "We want you as diagnostician for the central portion of the U S in case of need."

While standing thus ready for federal duty he was not idle at home. Emil Blunden, physician, had removed seven *Filaria loa* from his wife's eyes, beginning in 1907 when the two had been stationed in Batanga of the Cameroon. Four of the specimens had been excellently preserved by the doctor in chloral hydrate and presented to Wherry. Drawings of the worm in scientific catalogues had never been good and description of it, confusing. In a ten-page article [*33*] (senior authorship bestowed upon O V Huffman) Wherry remedied these defects. A bit later he described in an eleven-page paper [*34*] (senior authorship assigned to Paul G Woolley) twenty-two "spontaneous" tumors discovered in wild rats. They had been "found during the systematic examinations of rats captured or killed in San Francisco during the campaign for the eradication of plague (1907–08)." Wherry expressed "regret" that his report did not deal with the inoculability of the tumors —explained by a "lack of energy" and the absence of "time for experimentation" because of the demands of his routine. Two-thirds of the tumors were of epithelial origin, one-third of connective tissue; while the half were non-malignant and the other half, malignant. Practically every organ had been struck by the one or other kind. More interesting than his descriptions were some side notes. Several of the sarcomas and one of the epitheliomas, for example, existed in association with various parasitic worms. In another group, the "metaplasia was believed due to continued irritation of one sort or another. . . . It was difficult, however, to discover what the cause of the irritation was. . . . There were microbic parasites pres-

ent . . ." Reverting to the general question of what caused tumors anyway, he wrote:

These facts bring up the questions, whether it is the worms themselves or their secretions that are to blame for the tumor, or whether it is the ova that are chiefly to blame, as in bilharziosis of the bladder and intestine.

Wherry had yet another hangover from California. It concerned a plague-like disease of squirrels he had encountered for which no causal element had been discovered. McCoy was shortly to fill in this void. At the moment he wrote to Wherry (February 28, 1911):

The plague-like disease *you* mention is the most puzzling thing we have struck. The lesions in the squirrels closely resemble those of plague and in the guinea pig they would defy the most experienced to distinguish them. A guinea pig will turn up on the post mortem table and from the lesions, none of us can say whether it is plague or the other thing. The cause of the disease has thus far eluded us. I have concluded that I do not know much about cultural bacteriology because of the one hundred and more attempts we have made to isolate the organism, every one of them futile. Maybe we will strike it some day, but I am beginning to get rather discouraged about it.

Better weather, however, lay ahead. What McCoy had in hand was infection with a microörganism which before 1911 was over, he was to grow out on laboratory media and to baptize—the *Bacterium tularense.*

EMOTIONAL background for Wherry's daily work was of the best in 1911 and with trifling breaks it was so to continue. The scientific neighbors left in California were replaced by friends newly made in Cincinnati—and they grew fast in number. Even the die-hards of his reconstituted medical faculty were increasingly sure that Dabney had made no mistake when he brought Wherry into town. His immediate family was well; and the news from India was good. February 14, 1911, Mother reported:

. . . Your Aunt Sarah [sister of the Rev E M Wherry] has put off going [to U S] until Fall, as she thinks there is so much

to be done at Jagroon [locus of her missionary labors], and she doesn't care to be home for more than a year. We went to Allahabad and stayed three days at Dr Lucas's. Nellie & Miss Mitchell also went & they stayed at Dr Arthur Ewing's. We went to see the Exposition. It was like most of its sort and was really very good. We had tea at a tea house & sat down with some Missionaries from Persia and Egypt, and some travellers from Easton, Pa, who had been here before to see us. Then we went to Lucknow, and had for our fellow passengers the coachman of the Viceroy and a young Mohammedan who early in the morning spread his rug and knelt upon it and went through his prayers at a great rate. The Conference was a great success. . . . It was held in the Isabella Thoburn College of the Meth Mission. We were entertained at the Deaconess' Home, and part of the house was an old tomb, and the Mohammedan's grave was in the corner of the dining room, but under the floor. Our hostess was a Miss Inness. Her mother was a daughter of an old officer by the name of Tanner, who lived in Mussoorie & had a Mohammedan wife. When the parents died, the children were likely to lose their money—they were rich—but they called in a lawyer from South Africa who was in Mussoorie, & he won their case for them, then married this lady's mother. Miss Inness is an honorary worker and is a good Christian lady with rather thick lips and woolly hair as her father had some African blood in him. A good many people got ill there, from change of food & water perhaps. I amongst others. Your father kept up until he got home, then went to bed with a very bad cold & fever. We were afraid of pneumonia, but after a week in bed the fever left him, though he still has a bad cough. Miss Holiday of Persia and Dr Tweimer of Arabia came back with us & they & your father got the papers that were read ready for print, and sent them off to Revell in N York. I do hope that much interest was roused for the work amongst M's.

In the Methodist Mission at Lucknow, we met a young man who is a great grandson of our good old friend who used to live in River Forest. He has only been in India a short time, but preaches in the English church in Lucknow. The Meth's have several churches there—nice large ones. . . . It has been so cold this winter, but now that the weather is becoming

warmer, I feel better, for I dislike the cold. . . . How nice it would be if you could go to Europe next summer. I think it would be *nicer* if you could come on to India to see us, and the sights here, but—it takes a lot of money I know. There is still a good deal of plague here—not in Ludhiana but in India. One morning the dakwalla delivered our mail & by the next morning he had died of plague.

Father was no less realistic (May 25, 1911):

. . . I add a short letter to thank you for the pamphlets. I am greatly interested in all such study. The only wonder is, that such minute organisms as the *filaria loa* should occupy the study of so many great men for such long series of years. [In his printed paper, Wherry had traced scientific discussion of the subject back to Guyot, 1777.] It is also most interesting that your specimen should have been carried all the way from Africa to Cincinnati. What wonders Biology brings to light! By the way, I am most interested in reading a book, written by your old friend Dr Snowden [professor out of W and J] entitled *The world a spiritual system.*

August 30, 1911, marked a third report of his personal activities:

I have just finished carrying through the Press, Vol III of Lucknow Conference on Islam, entitled *Lucknow 1911.* As soon as I get bound copies I shall send you one. I am carrying two other vols through the press (1) my *Church History* in Roman Urdu—it is only about one quarter way as yet—& (2) *Vedic Civilization* in Roman Urdu by Rev B B Roy, . . . I am trying to unload & have sent in my resignation of the Hon'y Sec'yship of the C L S (Pupil Branch).

Mother's life with him in the country (Lal Tibba, September 7, 1911) was less hectic: "It is nearly tiffin time, and as I am housekeeper, I'll have to stop writing and attend to it." A month later, in a letter carefully marked "keep" by Wherry, the father told his life's story (October 12, 1911):

It is just 44 years since your mother and I left Honey Brook for India, via Boston & Calcutta. Many changes have occurred since then. We have grown old and gray. Our children (excepting two whom you never saw) are still in the land of the

living, and with them ten grandchildren. All of my brothers and sisters are living, excepting your Aunt Nancy, and your mother's only sister. This is a wonderful record for which we are thankful. Though separated, we have had intercourse by letter and occasional visit. . . .

My printed accounts will show [of the missionary movement] its progress during the decade 1901–1910. I also sent [you] a similar report for the C L S (Pupil Branch). The figures might interest some of your friends.

For the C L S, I published in 1900–1911, in Urdu & Panjabi, 95 books, making 221,000 volumes. For the American Tract Society, 84 books & Tracts = 200,000 vols. This totals 179 books—nearly all *new* and all produced under my direction—some of them my own and original. In all there are 421,000 books & tracts. Add to this:

2000 copies, *Islam in India & the Far East*
1000 " *Islam refuted on its own grounds*
1000 " *Present state of Moslem controversy*
1000 " *Mohammedan controversy*
1000 " *History of the church* (Roman Urdu)

along with numerous articles in American reviews & periodicals, and my constant work in editing the NUR AFSHAN as English Weekly for 8 years and in vernacular Urdu for 11 years & you will see that I have not been idle. I also compiled & edited the Annual Report for 11 years—each of 100 pages in range—and also one vol Cairo Conf Report & one of Lucknow. Pardon this personal history—I have never spoken of it to any one before.

In my report to Government I showed growth of our Indian Christian community *within the bounds of our Mission only:*

In 1901,	Organized churches were	20—	in 1910,	25 = gain	5
" "	Meeting places for worship were	38—	" "	82 = gain	44
" "	Communicant members were	2,083—	" "	5,402 = gain	3,319
" "	Adherents (Baptized children &c) were	3,376—	" "	10,817 = gain	7,441
" "	Presbyterian Native Community was	5,459—	" "	16,219 = gain	10,760

These are all included in the *Indian Presbyterian Church,* which has 14 presbyteries, 5 synods and a general assembly, which Church numbers about 50,000 members.

The men who write devoid of creed to show the failure of missions do not know what they are talking about. . . . We are planning to go home again in 1913. I feel that the strain of 8½ years is too much at our age.

Mother was a bit less concentrated. November 29, 1911, she wrote:

. . . The Board has been visiting us. They are just giving a few days to each Mission, but no doubt will know all about it when they get home! . . . Dr Noble got a good deal of money while she was in America, also a good big sterilizer, so they are prospering all around.

Late in December, she continued:

I am thankful to say that we are all living and pretty well. We had what was called the Bradt party, who are travelling around the world visiting Missions. There were 9 in the party. . . . . At Dehra your father met Nellie with a lot of Woodstock girls & came home on the same train with her. When he, your father, got home at 1.30 at night, he saw that *I* was not in bed, and after looking all about & not finding me he asked Mohammed Baksh, where the *mem sahib* was, and he giggled and said "Dilli Kogaya." The day before Miss James, one of our missionaries, came in & said that she & several other ladies were going, and begged me to go along, so I thought it would be a good joke on your father. . . . They were young Rajahs and looked so nice on their fine horses. That was the day the King & Queen arrived at Delhi. We got there at 5 ock in the morning having left Ludhiana at 2.30 the afternoon before. From the R R station to the Fort—not much more than a mile—the roads were lined with soldiers. A salute of 101 guns was fired—first 33 guns were fired, then a *fieu de joie* went off —which was a click of every gun, one quickly after the other —then 33 more, then another *fieu de joie* & 35 guns &c. By this time they had reached the Fort by another gate & inside had "received" the Rajahs, then they came out our gate. It was a sight worth seeing & I left at 4 ock that afternoon & reached Ludhiana at 5 in the morning, tired but pleased. I then persuaded your father and Nellie to go down for Coronation Day, which they did, and which they have not regretted. That

 day the King surprised everybody by proclaiming that Delhi was hereafter to be the Capitol of India, instead of Calcutta. Before he left the King laid the foundation stone of the new Capitol building. Then he divided Bengal in a way which has pleased the Hindus. Lord Curzon had displeased them very much by the way he divided it, then there were other surprises which I don't remember.

FORT THOMAS, KENTUCKY, 1911

VIII

MATTERS did not change with 1912. Father wrote that "the strain of work since Annual Meeting had been very great," including, besides home duties, "Trustees' meetings, University Convocations, General Assembly in Bombay —a ten-day absence—and two visits weekly to Jagroon to superintend building." Mother thought "it seemed to agree with him to have to drive about—it took him from his desk, altho' he had plenty of work to do at that." Father wished that he could go home to his "class jubilee at W & J. I have missed every reunion since I graduated." He warned Wherry: "I fear you are overworking your eyes. Your photo suggests the thought." Innocent of the fact that his granddaughter in Chicago had already been struck, he continued: "I hope that awful plague—infantile paralysis—will not reach you. I have been reading up on it. We have nothing worse than ordinary bubonic, and smallpox and measles here!" January 30, 1912, Mother noted:

A lot of poppies of a large variety have come up in our garden & I'm having them planted in beds—they look pretty when in bloom, and I don't feel as if I am encouraging the use of opium! I have a few chickens which lay nice large eggs, but I think we'll eat up the fowls before we go up hill in June. If left with the sweeper, most of them will disappear—"wild-cats, jackals &c" are said to carry them off, but we know very well that most of them are sold.

31st One of our Christian women asked me to trade my 5 good fowls for the common kind which she has, so I have done it. I had told her that we were going to eat them, so she was glad to make the exchange, as she wants to raise some.

By March things had grown less sunny:

. . . Robt Lakewood had to leave the Mission & India—he confessed to having lived a *vile* life out here. Went home a year ago & came out in Nov, then his conscience seemed to

 trouble him & he made some awful confessions. You remember I warned you about inviting him to your house, when he was in Am. It is an awful shock to the Mission. He tried twice to kill himself.

On Friday the Women's Home Misy Soc is to meet here. We have about 35 members. I usually serve tea & doughnuts. We have been giving out money through the Presbyterial Soc'y to help support a Bible Woman at Jagroon, but she has left that work so we will have to decide what our money will be spent for. This morning I was down in the city in my jin & I met a nice phaeton, with a Hindu lady & her little girl beside her riding through the bazaar. Women are coming out more than they used to, and are wanting schools. In our school there are about 80 Mohammedan girls and 30 Hindus. For the latter we have a separate room & a teacher, as they are taught Hindi, while the M's are taught Urdu. They have a Bible lesson every day, and are taught to sew too. We have a Eurasian lady as principal teacher. I visit it as often as I can.

Sometimes horrible things occur here. One night two weeks ago, the wife of Rev Mr Wood of the Church of England Miss in Lahore was wakened by some one trying to smother her—her husband had gone to Allahabad. She tried to scream & saw a big Pathán standing over her with a knife in his hand. She caught his hand & cut her own terribly, and yelled so that she was heard. He was a young Theological Student in her husband's school. He ran & got into his bed, but was arrested. His clothes were covered with blood so it was easy to tell who the guilty one was. He was tried & sentenced to 12 years rigorous imprisonment & a fine of Rs 1000—in default of payment he gets 2 more years of jail.

WHERRY had bowed into the year with a paper [35]. A four-page account dealt with the killing effects of the alkaloid of ipecac, emetine. Medical men had long used the drug, by mouth or by injection, in their treatment of amœbic dysentery; but no scientific study of the matter had ever been made until an army surgeon (E B Vedder) tried out the material in test tubes. Emetine had thus been found to be rather good as a strangler of various protozoa; but, what Wherry

felt equally important, effective, too, in holding down the growth of various bacteria. This pleased him, because amœbic dysentery in man always appears as such a double infection; in fact it was by the institution of this "symbiosis" that Musgrave and Clegg had succeeded in growing the amœbæ of dysentery in glass vessels. Via this method, back in 1909, Wherry had isolated a single amœba from the tap-water in Oakland along with a harmless bacterium. Three years later their descendants were still going strong. Well, here was a protozoan-bacterium mixture much like that always found in human instances of amœbic dysentery. What would emetine do to it? Wherry asked. It killed both parties, he found, but only after many hours of subjection to the poison, when the temperature was right, and if the amœbæ had not armored themselves by encystment.

In the summer he went to the Marine laboratory in Woods Hole where Mother wrote him of her mid-year vacation (July 9, 1912):

. . . I had a bad cook, so rather than try to get another one, we accepted Miss Mitchell's offer to come here [to the hills in Mussoorie]. We had a letter from your sister this week in which she told us of your having been made a full Professor, Will. I want to congratulate you upon this—and to say that we are very glad. You told us that your salary had been raised and we rejoice with you over that too.

. . . They are greatly in need of rain in the Panjab. The ferns on the trees show that it is coming. A lady Miss'y of the Church of England died lately of heat apoplexy. There are not so many cases of plague—there never are, when the heat is so great. I send a cutting [on T B prevention] for you to read but I dare say you know it all. Our pastor has been sent to Almora where there is a sort of sanatorium for treating tuberculosis. They give injections & feed patients on certain things.

He had dragged along his amœba to wet-nurse by the seashore, having diagnosed it in Cincinnati as one of the *Limax* group, more determinately *vahlkampfia, species No 1.* This meant that it never grew tails. He was just trying to discover

what kind of culture ground would most definitely yield his protozoon the more abundant life, when, behold! he found this "fixed" species possessed of "the ability to turn, apparently at will, into actively motile flagellated form" [*39*]. This was a change in biological nature as violent as when a nigger goes white, or a chicken develops webbed feet. Wherry loved the antics of his amœba so much that he got enthusiastic —he wrote an eighteen-page article about it, plus a fine set of his own wash drawings. What he wanted most, however, was knowledge of the conditions that had wrought this change from gelatinous droplet to flagellate. Why had other men never seen it? They had grown tired, for one thing, when they had cultivated their amœbæ but a little while. Wherry had observed his microörganism "daily, for a year" but still felt it only "a beginning towards an insight into the life history of a single species." Also, they had paid no attention to the kind of food fed their amœbæ, either in the general substrate or the bacteria.

Wherry got these matters under control. As to the bacteria, they seemed to make no difference, but as to the substances furnished in general food supply, this made a lot. The amœbæ were being raised on an egg-white fodder, and when so nourished never got out of their pudding form; but as soon as a little egg-yolk—shades of the viosterols!—was added, they made themselves into independent, free-swimming forms. Plenty of drinking water and fresh air also helped. Under such circumstances "literally hundreds or thousands of flagellates" developed out of their slimy ancestors—to return to their slimy form when again submerged in an environmental diet less rich.

Wherry's study of *Limax* was an extension merely, of his Philippine labors—further incursion of the field of "variation" in species as inducible through changes in environment. Besides his amœba, he had busied himself with another organism—the bacillus of tuberculosis. Two elements in its physical make-up had always appeared as "variants"—some of the bacilli would at times develop within themselves bodies which in other bacteria were designated "spores"; and yet others would lose their "acid-fastness."

As to the spores, [*36*] two or three of these commonly ap-

THE ASSOCIATE PROFESSOR OF BACTERIOLOGY IN
CINCINNATI'S REVAMPED COLLEGE OF MEDICINE, 1912

peared as more intensely stained spots bulging from the main diameter of the bacillus. Wherry recalled that such varieties usually turned up in old tuberculous lesions, like lung cavities. Here infection is generally of the "mixed" variety, in other words, the tubercle bacilli grow in conjunction with other microörganisms. Wherry repeated this state of affairs in test tubes by growing his tubercle bacillus in double. "Spores" appeared regularly when the *Bacillus coli* was house guest.

The effects of the latter upon the culture medium furnished the tubercle bacillus a something necessary for the production by it of the fat-like substance characteristic of the "spores," Wherry believed. What this might be, was an alcohol, he thought. Wherefore he prepared a series of soups of exact composition for culture of the organism. They consisted of salts dissolved in water with a bit of ammonia added (as a source of nitrogen) and then an alcohol of some sort. In all of them there was luxuriant growth. Any alcohol did the organism good but some were better than others. Best of all for the production of "spores" was propyl alcohol. Thus another "variation" in morphology was proved to be dependent upon the kind of food furnished the organism in its environment.

These studies showed Wherry that the presence of certain food substances improved not only the opportunities for the development of "spores" but for the development of "acid-fastness" by the organism in general. The term is statement for a characteristic of the bacillus of tuberculosis not common to the general run of microörganisms. Back in the seventies of the eighteen-hundreds, observers with their microscopes found that by pouring the newly discovered aniline dyes over their bacteria or the slices of tissue they had prepared for microscopic examination, certain parts (like the bacteria or the nuclei of cells) took up the dye, thus to expose themselves as more strongly differentiated figures against a less defined background. By this method the great Robert Koch had first made visible the rod shaped organisms which, buried in tissue, he held to be the cause of tuberculosis. But all organisms could be "stained" by such method. What Koch now brought out was that the tubercle bacillus, once so stained, resisted *destaining* if bathed in acid. All other organisms, after such ablution, yielded up their cosmetics, the tubercle bacillus alone

(like some other organisms to be discovered later) being "acid-fast." Acid-fastness thus became a characteristic of the germ.

Wherry had long had in hand a strain of *B tuberculosis* gotten out of Koch's laboratory in 1888 by his distinguished pupil, Victor C Vaughan (*1851, the one-time Latin teacher who as professor of hygiene and physiological chemistry in Michigan's university showed how flies, sloppiness and typhoid in 1898 killed and maimed more American soldiers than Spanish bullets). Even then it had been the 106th transplant from one of Koch's first cultures. Wherry had watched it for some years himself, transplanting it to a new garden every two months. Time and this hard life had tamed the brute. In 1913 Wherry described it as a "saprophyte"—meaning that it could no longer produce disease, even when injected into the least resistant of animals, the guinea pig. Correlative sign of its weakness was the organism's inability to retain color—it was no longer "acid-fast" (acid-*proof,* as Wherry said correctly in his meticulous English). Wherry would see [*37*] what in laboratory life had thus brought down the old "captain of the men of death." He grew it out once more on the meanest of culture grounds, but one of which he knew the exact composition. In these, "acid-fastness" never appeared. Whereafter he added various alcohols, and various sugars; and now the acid-fastness returned, even to the point where all the "rods" stained deeply. The vinegars and ammonium salts (or the simple ammoniacal compounds found in digested meat) along with some simple sugars or the alcohols (propyl and glycerine) were all that was needed. Thus he made another "inborn characteristic" of a "species" merely a matter of its "environment."

FEBRUARY 7, 1913, Hektoen wrote: "To come to the point at once—I would like very much to know whether you would care to come back to Chicago and work in the Memorial Institute."

Ever since Wherry had been brought as subaltern to Cincinnati, Hektoen's blood had boiled. Now the new John McCormick building and hospital for infectious diseases, of which he was chief, was about to be opened on Chicago's West

Side. The master had opportunity for the first time to proffer Wherry those better backgrounds for his work that its quality deserved. But matters medical down in Cincinnati, too, had taken a turn. Woolley had been dean three years, and no job had ever been worth that much time to him. Furthermore, Cincinnati's new great hospital was about to open. It was shortly to be the body of Cincinnati's medical school. Christian R Holmes had built it; was now looked to, to run it. He was professor, also, in the college—what better sense than to make him the boss of the whole outfit? First of his orders concerned Wherry who would henceforth be head of a new and separate department—bacteriology and preventive medicine —at increased salary. Wherefore Wherry replied to Hektoen's letter as follows (February 15, 1913):

I was very glad to get your kind note but hardly know how to answer it. There are many reasons why I should like to be in Chicago. On the other hand I have felt quite well satisfied here for they have fulfilled all their promises—given me a full professorship at 3000 and required only 3 months of teaching. In a year we will be in our new pathology building. The only unpleasant complication I can foresee is the possibility of a shortage in equipment and supplies.

Then, it has been a great source of satisfaction that the men here have not urged me to "make good" by publishing something every three months. I am very slow in planning and carrying out experimental work and in analyzing the results; and any urging would upset the apple cart, I'm sure. This is especially true since I have had an obsession concerning the importance of going back and beginning the study of the biology of bacteria all over again; and work with synthetic media is, to say the least, discouraging. Such work, aided by the principles of selection, seems to me to offer as great possibilities and results as those that have been obtained by botanists. So, if nothing interferes, I think I will keep on with this sort of work.

On the ancient principle that it never rains but it pours—Wherry was thirty-eight and had lived through many drought years—three further requests came to him. W G MacCallum, professor of pathology in Columbia, asked: "I am writing to

see whether we could tempt you to come to New York." Edwin O Jordan of the university of Chicago inquired (May 8, 1913): "Would it be possible for you, and would you consider it worth while to come here for the spring quarter of 1914?" May 30, 1913, he wrote further: "I shall not be able to get more than $800 from the president for this, but there is another fund I can tap for $200. Write me formal acceptance on the $800 basis and we can consider the matter clinched." Now Wherry's Manila friend, John R McDill, returned to Milwaukee for living and to Rush in Chicago for teaching, wrote: "I need a man like you for the biological part of it. Perhaps," he added, "we can get the U C to put in a dept of trop medicine." But anything as needed, or good and great as that, was, of course, never to be. This tropical zephyr merely died in Chicago's windy corridors.

McDill added in subsequent letters opinion and advice which publicly or privately viewed are worthy of note. November 16, 1913, he wrote:

I wish you could see how some of the clinics are at present conducted at Rush. One of the best *surgical* clinics that I ever saw was given by Frank Billings; another by Bertram Sippy. An evening program supposed to be surgical was by Rosenow, Billings and Mix.

Whereafter he added:

I am telling you this even tho you know about it, because I want to point out to you the advantage of employing your latent abilities as an internist—the advantage to the patient, your laboratory, your enthusiasm and, incidentally, your pocket-book. You may have been cultivating that side—I hope you have—but if you have not, I advise you to affirm that you are open to practical work when it promises to be worth while to you scientifically.

As a matter of fact, Wherry had been, was and was to continue at just such program. With Woolley and Forchheimer, Saturday mornings were already given over to "pathologico-clinical conferences." As to insistence upon freedom to do as he wished about any sick man who made appeal to him, this was principle with Wherry that endured throughout his life. Any narrowing of medical activity or mind, whether it

 came through collegiate designation as "full-time" instructor or as restriction in scientifically applied labor for the ill—every mounting "requirement" or formulation of "standard" in "teaching"—was anathema. Free souls, freely thinking and working as they pleased were his ideal, from medical student to dying doctor. His scientific labors might correctly enough have led to increased revenue (it was "moral" and he needed the money) yet such never came to him. This was because all who knocked might enter—their diseases were the same, weren't they?—and those without funds always constituted the majority of his "practice." His ill were those that the medical world had rejected, for which it believed nothing more could be done—a lot of cancers, paralyses and the generally maimed in joints or muscles or nerves. With them came another non-paying clientele, esoteric in its demand for the best—doctors or missionaries.

Still speaking into the blue of the marginal medicine of the moment, McDill wrote:

We were enormously impressed by Rosenow's work on secondary bone, muscle and joint infections. Simply monumental! And only a few days ago he cultivated an organism from a human stomach ulcer, and reproduced the ulcer in a dog by injection of the organism into its general blood stream! . . . Two of the surgeons up from your city got a little excited at the prospect of losing you. Let them guess; it will do no harm.

The summer of 1913 again took Wherry to Woods Hole. He answered a letter of mine, enthusiastic about the Canadians, as follows (July 21, 1913):

Have been trying to convince you for several years that the English are the real cream of the earth's population, *i e* the top scum. I can now bend my energies toward converting you along other lines *e g* that every cell is surrounded by a true semipermeable membrane. The only reason why you can't see "how in the devil the cell can then live," is, because you don't know, nor does anyone else know, *what* a semipermeable membrane is! Yet they teach the students here, all about it. You ought to visit us; it would do you good.

Opinion on some of his coworkers followed: "A P Mathews

finds himself the only insurgent left among the older men." H B Ward, Edward B Meigs and G L Kite (of whom more, later) came in for warm praise. Of a man who had become one of my critics, he wrote:

He is really a very nice fellow, but my dear Boy, you may never fear that *he* will someday flocculate your colloids. He has just as much originality as a sulphur-crested cockatoo. But then, that is what makes him such a nice fellow. I'm tired of these damned original grumps who live in everlasting terror lest some other damned original grump beat them to a hypothetical explanation of a problem unexplainable. Here, for example, they are still harping on the old idea that every type of germ-plasm is of a specific kind & can only give rise in each instance to a specific type of organism—and yet if they would but reflect a bit they might recall the fact recognized by all laymen since earliest times, that the human ovum, at times and in places, not infrequently gives rise to an ass.

I had a devil of a time with my rabbits. They cost me about $2.00 & you should have seen me going up 5th ave N Y with the rabbit box! Now besides them, I had to take care of a family of seven—1 wife, 2 kids, 2 parti-colored rats and 2 white mice. Things would have been easier if I had given the mice away and raised more kids.

Medical registration, because of mounting requirements for admission, had gone into a tail spin in Cincinnati. Wherry commented: "Dabney is rather discouraged about students for next year—thinks we may have 3 or 4 freshmen if we're lucky. Well, goodbye."

MARINE BIOLOGICAL LABORATORY WOODS HOLE LIBRARY MASS.

WHEN Wherry returned to Cincinnati for the 1913 medical school opening, his contribution to Forchheimer's five-volume *Therapeusis of internal diseases* awaited him. Frederick Forchheimer had in 1908 hit the medical writing bull's-eye with a one-volume text, *Prophylaxis and treatment of internal diseases.* Physiologically trained and a scholarly critic of his professional world, which in getting increasingly right in diagnosis had gone increasingly wrong in doing anything for the stricken, his single volume text came

 as new gospel to half the doctors of U S—the only group left on earth after a holocaust of scientific "advance" with even remnants of interest in treatment remaining. The success of the volume had made its publishers cry for more, and this five-volume text had been the answer. It had taken Forchheimer almost five years to edit the work and the labor of it killed him (†June 1, 1913).

His nose had ferreted out Wherry to assume responsibility for a section on *Tropical diseases*—the commission referred to as something to be held secret three years earlier. Not wishing to do it all by himself, Wherry had suggested, and had had added as coworkers, Woolley and Wellman. The three did a fine job. These notes relating to Wherry's part are not in consequence to be taken as criticism—other men in other chapters might as readily have been taken for example; they are picked upon merely as contrasting background for what was Wherry. Publishers and editors write "blurbs" about their writers in which they list their degrees, where they held job, cite in brief their qualifications for the task in hand. It required five printed lines to tell of Woolley's past; three to tell of Wellman's; Wherry got a half. It said: "Associate Professor of Bacteriology, University of Cincinnati." A later issue added: "A B, D D," which silently pleased him; and gave him endless amusement.

He had been commissioned to cover as many pages as he would. Paid for by the folio and needing the money, here was opportunity. Altogether, the section devoted to tropical diseases covered 209 pages. Wherry took 41. Standing in my laboratory with the finished manuscript in his hand he announced: "This is all there is to be said on these subjects."

I have stressed before how Wherry was never better than when draughting the outlines of some "general" subject. He had uncanny sense of where the simpler elements belonged in the total architecture—even when he had baked the bricks of a structure himself. It led to a lasting difference of opinion between us regarding the growing rigidity of American medical educational programs and the limitation of professional class numbers. Wherry was in his own person the greatest defense for my position that I could point to, as I insisted that he should lecture to the five hundred instead of boil soup for

the five. Scullions could be found for the latter—not for the former.

Of the thirty-odd items that made up the tropical disease section, Wherry covered seven. Reference will not be made to those on Asiatic cholera, [*45*] Malta fever, [*46*] filarial disease [*43*] and those due to one-celled organisms, [*41, 42*] authoritative and critical as they were. He wrote the opening chapter for the entire set on *The rôle of the medical man in the future control of the tropics* [*40*]. This was the beginning sentence:

Encircling the earth, between 30° N and 30° S of the equator are tropical and subtropical regions—the most beautiful, the most fertile, the most richly endowed portions of the globe. Time and again they have been invaded by northern races in search of wealth. Stricken by strange pestilences of mysterious origin, the invaders disappeared. Gradually the rumor spread and the belief became ingrained that there lay "the white man's grave."

To get at once to the heart of the problem, he asked:

Will modern science operating through the medical man be able to neutralize the forces which act deleteriously upon the white man in the tropics? . . . The problems facing white settlement have been greatly modified by recent advances in our knowledge of tropical diseases, but these researches tend rather to promote . . . the efficiency and supply of black labor than to guarantee successful and permanent settlement by whites.

Allowing that hygiene could protect the white man against the diseases peculiar to the tropics, what about light, heat, and moisture? To which Wherry answered: "He must acquire more pigment, go unclothed, readjust his thermoregulatory mechanism—nervous and cutaneous." It was not an end easy of accomplishment, yet a situation that had to be met, for, said Wherry:

The fact remains that the tropics are largely in his possession, and that he will have to face the problem of developing their enormous natural wealth as a source of supply for an overcrowded world—not by the old and reprehensible system of

 exploitation, but by holding and developing them as a trust for civilization.

Here, his ideal of the doctor was speaking, as it had been bred into him on Halsted street in Chicago and nurtured by his trampings about the world. This man was to go forward but not as *conquistador,* salesman or tax collector, but as one charged to make better this human existence.

The modern moment had separated economics and sociology from the spiritual body of man; so had the biological sciences broken with folklore, with fairy tales, with what some are pleased to call "religion." What Wherry thought in such matters is best told in his own words, wherefore this lengthy excerpt from his scientific exposition of plague [*44*].

Comparatively recent discoveries have placed in the hands of man a sure remedy against the plague. For now we know the elements which, when brought into conjunction, start that prairie fire which thrice, in recent times, has swept the earth with its destroying blast. Certain rodents, their fleas, and man are the combustibles; *B pestis* the spark.

Medical prophylaxis looks into the future as far as possible, and builds a barrier which, though like the wall of China takes a hundred years, stands forever. All efforts which bring about temporary prophylaxis alone are wasted, along with time and money. Why is it that even so-called civilized races resist our efforts to bring about immunity to disease? The answer would be totally discouraging were not ultimate victory so desirable. . . . Thus the plague problem is narrowed down to the rat problem. . . .

Rats did *not* embark with Noah. For is it not revealed in the *Quassul Ambia* of the Mohammedans how that patriarch, having forgotten in his hurry to install sanitary arrangements in the Ark, appealed for help from on high? The pig was created to clean up the accumulated offal; but the ever-restless Shaitan drew forth from the pig, rats which multiplied enormously, and their gnawings endangered the whole animal kingdom. The angel Gabriel, descending upon request, instructed Noah, and he, passing his hand over the nostrils of the tiger, drew forth cats, which soon held the rats in check. One should be glad to know this in order to place blame and shame where

they really belong. We must admit, however, that Shaitan was clever when he endowed his children with such extraordinary fecundity. After thousands of years, suffering mankind has waked up, in spots, to the moral necessity of making a concerted effort against the offspring of that Evil One. We have national and international societies for the destruction of vermin, and one small nation has found it profitable from a business standpoint alone to place a bounty on rats. This is a good beginning, but there seems to be some confusion about the *modus operandi.* Had those Poles not checked those Eastern hordes, we would have taken in with our mother's milk the knowledge that the cat is the especially created enemy of the rat, and the reasons therefore, and so have averted the just criticisms of Buchanan. To expect extermination of the rat seems preposterous, for we are but human. However, so far as plague prophylaxis is concerned, that is unnecessary; the factor of safety may be reached by reducing their numbers.

Buchanan prevented the recurrence of plague in certain Panjab villages by importing cats. . . . "It is one of the measures of plague prevention dictated by their scriptures to Mohammedans and Hindus alike, and which will, therefore, be acceptable to all."

Independently R Koch expressed the opinion that the only solution lay in the breeding and maintenance of an efficient race of cats. Like Noah, he found that keeping them on ships bound for the tropics insured comparative freedom from rats. His plan has been advocated by Kitasato in Japan. There the latter found that the percentage of cats to houses varied from four in Tokyo to forty-nine in the Yamanashi district, where cats are kept to protect the silk industry from rats. Shiga considers the latter place safe from plague; we know that the former is not. That sounds like plain sailing, but Shaitan has kept busy—he put the *Cysticercus fasciolaris* in the livers of rats and mice so that cats may suffer and often die; and strange ideas into the brains of the more weak-minded humans.

. . . When a corporation or large stable owner is able to evade successfully an explicit ratproofing ordinance in the face of a State Board of Health backed by the Federal Government, one must surely conclude that the relation of hygiene to material progress is still unappreciated. . . . In the mean-

time, where social conditions permit, among the simple-minded so-called savages, among physicians, nurses, and sanitary inspectors, and in such others to whom perpetuity seems desirable, one may produce temporary immunity to plague by vaccination with dead or living attenuated cultures of *B pestis*.

DECEMBER 1, 1913, began like every other day—the usual set of "specimens" had collected in the ice-box and the usual set of calls for "pathologic consultation" lay on Wherry's desk. Among the latter, Derrick T Vail, chief of staff in the ophthalmic division of Cincinnati's general hospital wished his look upon an eye case that had gone wrong. The meat cutter's left orb had reddened November twenty-first and by the twenty-fourth had so swelled that he needed a doctor. Some ten small ulcers punctuated the lining of his eyelids; but the man was so sick all over that more than these had to be considered. Things were spreading, too, that was plain, for the lymph gland in front of his ear was tender and before the week was out all the similar glands in his neck and arm pit followed suit. Now he was very sick, looked it, and had high fever. To make things worse, a lot of small boils appeared about his temple. Because he was a butcher and so had doings with animals, glanders was suspected. All it needed to clinch the thought was Wherry. Wherefore he appeared—with his platinum needle to make many smears and more cultures. Well, it wasn't glanders; nor was it any other common garden variety of microörganism that was doing the mischief. Wherry would have discovered anything like that right away. As a matter of fact all his looking and staining were in vain. Worse yet, nothing grew on all those culture media that he had inoculated and dragged back to his inner laboratory—and he knew how to tease the tenderest of this world's creatures into growth. At this point any ordinary bacteriologist would have called it a day, closed his ledger and next morning "reported": *cultures sterile*. The situation is repeated daily. To these men negative findings become proof, even, that here, thank God, is a pathological process *not* infectious in origin; something due to the dissolute or unchristian life of the stricken, perhaps. Such report comforts the doctor, too. If

science cannot give answer, why should he be expected to know? And as to the patient, well it's his disease, isn't it?

And so after some weeks, and still very ill, the meat butcher tired of his hospital residence and left.

But Wherry had not forgotten his man. On December fourth he again scraped a bit of tissue from an ulcerated patch, stirred it up in salt water and injected it into a defenseless guinea pig. Five days later it was dead. Autopsy showed its lungs, spleen and liver to be riddled with minute patches of dead tissue; but most careful staining methods, attempts at culture, etc, revealed nothing certainly identifiable as bacteria. So Wherry took of the spleen of this animal and injected it into a second. In five days it, too, was dead. More than a month and twenty-four animals went into this disheartening business. Obviously the disease was there, but why could he not isolate the organism?

Perhaps it was a "virus"? This is the refuse pile to which all organisms are relegated, supposed to be present but too small to be seen with the microscope. Wherry knew how to get answer to this question. Twelve years before he had calculated and shown how, if so small, they went through filters of specified pore size; how if not, they stayed behind, were large enough then too, to lie within the visible range. He tried to filter his unseen organism and found it not to pass.

Clearly something else was wrong. He had not discovered the right nourishment, he said. So out of Musgrave's and his own experience he recalled the virtues of eggs. On such diet—variously styled, to be sure, to get away from the too-simple restaurant designation—Wherry now grew out the causal agent of his death-dealing disease, succeeding at the same time, by modification of the existent methods of staining, in making it readily visible under the microscope. It was a little bacillus, so short that it commonly looked round, with a capsule covering it like a halo. Besides this description [*47*] Wherry brought forth some further facts. He reported:

We kept the virus going chiefly by rubbing a little spleen pulp into a scratch on the abdomen of animals. Simply dipping a fine needle into the spleen of a dead animal or into a culture and pricking the ocular or palpebral conjunctiva of rabbits

or guinea pigs resulted in the production of multiple areas of necrosis just like those in the human case and was followed by septicemia and death within a very few days. . . . Some experiments showed that death might occur when infectious material was simply placed on the uninjured mucous membrane of the eye or nose.

These things showed how burningly infectious his microorganism was. Worse yet was the story of "guinea-pig 39." It had eaten "most of the spleen of guinea-pig 33 chopped up and mixed with bread. It died in three days and showed characteristic changes in the liver and spleen and involvement of the cervical glands." Excellent descriptions of the organic changes followed the accounts of his experiments, along with beautiful colored plates (this was the invariable expression of enthusiasm and satisfaction in his work on Wherry's part).

Could this so highly virulent organism be tamed a bit; or could it be made yet more deadly? Mere cultivation in the laboratory did not act toward the former end; nor the commonly practiced passage from animal to animal toward the latter. In both instances the newly infected just laid down and died in five days. Asking now which of the animals commonly seen about a farm might prove the most likely "hosts" of the disease germ, he discovered that the ordinary domesticated stock was rather resistant; but all manner of "rodents" went out promptly. In Ohio and vicinity this meant the rabbits, the squirrels, the rats, the mice and, of course, their imported South American cousins, the guinea pigs. Whereafter (out of a "case report" again!) came the philosophic kernel:

Our findings indicate that this disease is widespread among rodents . . . it may someday take its place along with *B pestis* as a menace to man.

THOUGH Wherry had isolated his organism independently, and that by cultural and staining methods essentially his own, he now found its general characteristics to be identical with those of an organism isolated from the California ground squirrel by Geo W McCoy (and Charles W

Chapin) a year earlier. It will be remembered what a headache McCoy had gotten out of his inability either to see or to grow the cause of that plague-like disease so often referred to in his correspondence with Wherry. By the use of coagulated egg-yolk he had at last succeeded. Since the source of his infected squirrel had been Tulare county, he immortalized that lovely spot by calling the new organism, the *Bacterium tularense.*

What do scientific men do in such circumstances; and what did Wherry do? With one stroke of his pen he passed all credit for discovery to his old-time associate.

Now another instance of human infection was brought to Wherry's attention by Robert Sattler; and a third was to be reported in the next year by the brother (Frederick W Lamb) of his associate in these first studies (B H Lamb). Some half dozen more came upon the floors of his hospital to be recorded only in the newspapers. An interesting variant was introduced by some of the latter in that original infection had entered, not through the eye but through a finger to spread to the glands of the arm and arm pit, always accompanied by high fever and invariably in men who had dissected rabbits. But Wherry was no longer looking for examples but for the spring of infection. "We have been anxious to find the source of human infection in this locality," he wrote [*48*]. His experiments had shown that rodents deserved first consideration; and Vail's patient had been a specialist on *Hasenpfeffer.* Now came farmers' tales of death-dealing epidemics among the rabbits. In November, 1914, such a story originated in southern Indiana. Cincinnati's coöperative health officer (J H Landis) sent two huntsmen into the district to bring back what they could. They shot three rabbits and found two dead on a farm some miles beyond Vevay. The latter were infected of *B tularense.* Wherewith the story of human infestation with "rabbit-fever," from its beginning to its end, had been told.

Wherry did what he could "to help physicians in the discovery of further cases in man." He would furnish the diagnostic brains if they would furnish the pus. "They may well prove to be cases of this disease when there is a history of having shot or handled rabbits, squirrels or ground-squirrels." 1914 closed with his presentation in concise and final form of *A new bacterial disease of rodents transmissible to man* [*49*].

 Then he allowed this interest to become a part of the deeper lying portion of his life's current.

Additional instances of the disease came to notice in Cincinnati's general hospital but Europe's war was a more intriguing proposition, wherefore for the colleagues and the public, interest in "rabbit fever" slumbered. One of his playmates (in 1924!) asked if C Pascheff (of Sofia) had not "discovered" the disease. Pascheff had described it (in 1915), had even transmitted it to laboratory animals. But he had done this as a double infection, falling into error by describing the accompanying organism as the essential "cause" of the disease.

After the War (in 1919) E E Francis (forty-seven, M D out of Cincinnati, long of the staff of the U S P H & M H S) began exhumation of the stiff. He had discovered that the "deer-fly fever" of Idaho and Montana was infection in man with *B tularense;* also, that it was carried from rabbits to men by the bite of this fly. This was scientific confirmation of the voodoo belief of northwest deer killers. But back in 1912, McCoy had already shown that fleas could do it. In 1921 Francis rechristened Wherry's "rabbit-fever" (the name first given *tularense* infection by a newspaper scout) *tularemia.* Now many men with many articles added to the "literature" of the subject. One even wrote a book; but all never learned, or forgot, the by this time ancient history here set down. It was even proposed to call the disease by a man's name—though not that of McCoy or Wherry—but this fervor died. In 1925 Wherry was active upon the only item left untouched in his brief publications—that of the treatment of the disease. But its discussion is more properly taken up later.

THE *tularense* studies had carried Wherry into the new year of 1914. All day, each day, he had cultured, inoculated, autopsied, peered for hours through his so belovèd Zeiss apochromatic 3 mm 1,40 oil immersion. The Christmas holidays had made no difference. Young Wolfgang Ostwald, invited of Wherry as head of Cincinnati's research society to lecture on colloids, came. They had long discussions together of matters biological (Ostwald had been born such, too). The latter departed, declaring himself "captivated of Wherry."

Whereafter lightning struck; and Wherry sickened. He went to bed with "grippe;" but at the end of a week was worse than at its start. Two weeks passed, and his old-time friend came down from Chicago. Rosenow said he had pneumonia. Wherry picked at his bedclothes, ran fever and lay thus for six weeks. He had been breathing and handling much *tularense*. May that have been the miasma that invaded him? Remembering nothing of his sick days, he sought the sun in Florida. Here the father sent to his son thanks that he had not died; adding: "We are very much saddened by the apparently hopeless condition of Aunt Fannie. She is however one of the Lord's dear children and He will care for her."

Wherry sent me a post card from Daytona (March 9, 1914) where James Gamble had insisted that he come to his house:

This is a beautiful place on the island & right on the Halifax river. The ocean is a few minutes walk across the island. It is pretty cool, 56° F at 12 o'c yesterday and 37° F early this a m. Please write at once and let me know about Helen [the wife of Paul G Woolley who had been acutely ill]. I have been getting stronger every day & can take quite a respectable walk but am very stiff & my pleuræ still stick.

Aunt Fannie's state grew worse. Wherry returned to Cincinnati to see her die. April demanded his presence in Chicago. Settled there, he wrote from the department of bacteriology in the university (April 11, 1914):

I am o k and enjoying the work here. I have a class of fourteen fairly good students—in fact most of them are the pick of the soph medics. I was able to get out of the tropical courses at Rush. Rosie [Edward C Rosenow] told me I couldn't undertake so much, so I was able to fix it up with McDill and the course has been postponed indefinitely. I went to lunch with Wells [H Gideon] the other day. He is very nice and told me that he had "defended" you in the East many a time. You are so damned bull headed and dogmatic that they don't understand you down on the eastern "sho." I think that Taylor's [Alonzo Engelbert] fears that young Ostwald's visits about the country would do you good are being realized (you *are* a sly fox for a Dutchman!). You see, no one knew anything about colloid chemistry in this country (excepting A P

 Mathews and a few like him) and consequently, not being able to judge your work and being too damned lazy to look up the dope on it, they dismissed it. Now, having received elementary instruction in the Field they are better able to see that perhaps your work has something to it—but of course not such a sweeping damned lot as you claim. Rosie examined me about 10 days ago and seemed to think that I was all right. Wish you could be here too. But I must close, for Marie & I swore yesterday to cease talking about our *childhood days*. Give my love to everybody and tell them that if Cincinnatians weren't so lazy, Chicago wouldn't be able to put it over them in any way that I can see.

One product of Wherry's experience in Chicago was a renewal and a deepening of his friendship with Jordan; another, a meeting with M W Beijerinck. The two world names on variation in microörganisms as inducible through change in environment, thus stood side by side. Beijerinck bid Wherry follow him to Holland to demonstrate his findings there; but still wretched after the experiences of the winter he wisely decided to stop with his family in Woods Hole. The product of this vacation was another paper [*50*], this time with G L Kite on *the mechanism of phagocytosis*. Amœbæ and the free swimming white cells of the blood had always been endowed with a sort of intelligence—they "chose" their foods and swallowed them or not, as they deemed fit. Wherry thought the matter overdone. He suggested instead that it was all a matter of accident. The surfaces of the white blood corpuscles were "sticky" and when brought in contact with foreign particles (like carbon, carmin or the bacteria) just naturally picked these up. It was a matter of chance meeting merely between the two; and the degree of this stickiness. There were rules to the game but they weren't psychological rules. Some leucocytes would swallow bacteria no matter what their kind or state. Others had to be coaxed. He reverted to his medical school studies to ask about the "opsonins." They turned out to be materials present in blood which so changed the bacteria involved that this relative stickiness between surface of leucocyte and surface of germ was made just right for the engulfment act.

Initial discovery of the sticky nature of the surface of amœbæ Wherry attributed to Sellards and his coworker in this paper, G L Kite. When in their gelatinous form amœbæ were always thus sticky; not, however, when in the flagellated state of their existence. While their paper detailed experiments entirely bacteriological, Wherry assigned senior authorship to Kite. It was his way of expressing publicly the high regard he had for Kite's discoveries who had used the Barber pipette for the dissection of the single cell. An amœba, he showed, might be sliced as so much meat; certain structures seen within cells and assumed to be liquid (like the reproduction "astrospheres") were more nearly solid and could be dragged out of the cells as sugar crystals out of jelly; also, the surface of cells was anatomically scarcely differentiable from their general mass. "Kite is condemned as crazy because he has proved all the accepted physico-chemical notions of the living cell wrong," he wrote me. Perhaps the wish fathered the fact. Kite visited a neurological institute; and in another year was one in the history of science with Robert Mayer and Ignaz Philipp Semmelweis.

Aunt Fannie's death eased things financial. The house at 759 Ridgeway avenue and a bequest came to Marie; much of the other property went to foreign missions and a fund for "worn out" preachers of the Methodist church. Enough remained over for the education of the children and to express Aunt Fannie's deep-seated affection for Wherry, in spite of his failure to be of one mind with her in biological philosophy. Her estate set aside the sum of thirty thousand for the use of his laboratory. He needed it sorely enough, and yet before the gift had come into his hands he had assigned the half of it to a brother division in the medical school (mine).

August of 1914 brought the War in Europe. In November the father commented:

> The war's various fortunes render mail service uncertain . . . Give our warmest love to Dr & Mrs Nast who must be greatly distressed. We are all subscribing here for the support of the German missionaries in India. A united movement among about 4000 missions will bring a large sum even at monthly subscriptions of Rs 5/ each.

November 11, 1914, he was still sufficiently detached to *sos:*

I'm honorary member of the Luther Burbank society and have subscribed to 12 illustrated volumes to preserve to the world the discoveries &c of Luther Burbank. They may send them to you. Care for them. They will cost $81/—Whew! You may open them and see & read but take good care of them.

Values beyond the immediate of war persisted. Sister Lillian out of Kasur where she and her husband were stationed wrote long paragraphs of the "kiddies," concluding (January 28, 1915): "We get nothing but war news out here & are sick of it! But not half as sick as the poor people who are in it!"

IX

THE McCuskeys were "in camp in a field away from the village but within easy walking distance of where the preaching tent is." In spite of growing need in Europe, the missionary movement was holding its own in India; and Lillian could write: "The Xtians insist on supplying us with milk—6 & 7 *seers* a day! So we have plenty of butter. They also have presented us with wood." Of her own labors she reported:

I saw the women at noon and talked to them. I am hearing them recite the 10 commandments, Lord's Prayer & creed. Not half of them know these. I hope then, that the women I teach will teach others. The baker's wife is no good. She can't read and also she doesn't know enough herself to teach the women.

Statistics chiefly, made up a closing paragraph:

We were out for two weeks this trip & Frank baptized about 250. This District is right in the Mass Movement & whole sections of villages come out (i e are baptized) at one time. Of course this is all amongst the Sweeper Class. The new converts are learning fast & it is wonderful what a difference it makes in their appearance, their homes & lives. We haven't nearly enough teachers. We have far more boys ready to go to school, than we have room for. . . . You have a busy life too, but do take time to write. I dread "growing away" from my own brother. I am only *just* beginning to realize that I am a really grown up woman!

Word from mother, too, indicated that the general scene in India had not been much disturbed. The rains had "soaked the ground and laid the dust, too"; whereafter it had grown cold. "Plague is flourishing—always does in cold weather." Commenting on Lillian and her husband's activities outside Kasur, she referred to it as a district:

. . . where some of those Sikhs live who came back from Canada on that ship *Komagatu Maru* and are trying to stir up sedition. . . . A lot of them landed at Ludhiana. I saw them wandering about in European clothes, their long hair was cut and also their beards shaved off, so that I scarcely recognized them. . . . The Ludhiana district is a bad one for thieves. The Salvation Army people have started a weaving business where many thieves live, hoping to redeem them from such lives—having to steal for a living.

By February 20, 1915, she had grown a bit critical:

Have our letters been opened by the censor? Yours all are—even the newspapers. One week a bit was cut out—I suppose it wasn't fit for us to read. It now takes 6 weeks for yours to reach us.

Reporting at once on things medical, psychological, spiritual, economic and political, she continued:

One afternoon about 4.30 your papa and I went to call on the doctors of the Med School. It was their tea-time and we thought they would be in. They are so busy they are hard to catch. Dr Maja came to the door and said that Soni had taken strychnine. So Dr Brown ran, and the girl denied having taken it, but was *dead* an hour afterwards. There were 2 native girls who were fast friends but they had quarreled and the other one had taken up with another girl as her friend so this one said she couldn't live without her and did take poison and lied about it. They are so silly sometimes. Plague is very bad in the Panjab just now. I have closed my little school, as the father of one of the boys died and some were sick in the homes from which the children come . . . It is pitiful to see and hear them when anyone dies. I passed a house a few days ago from which I heard a woman screaming. I inquired and found that her 14 yr old boy had just died of plague . . . Lest you may not have recd my letter I thank you again for the pretty blouse & the nice necktie for your papa. They are just what we needed. . . . While away this last time the missionaries' salaries were raised to $100 a month, so that we have plenty.

22nd Feb Those Sikhs that came back from Canada are trying to do somebody harm. They have thrown several

bombs. . . . & on Sat a Sikh shot a head constable and a subinspector of police. They are very bitter.

Some of this bitterness of soul got into the animals. (Wherry was always sure about these Indian transmigrations.) Lillian reported as follows of her husband who "had just left in a tum-tum this morning:"

He really left yesterday on a camel but it acted so badly that he walked back. The camels are all acting very badly just now. The riding camels won't let anyone mount, & if one manages to mount, the animal tries to knock him off against a tree.

On the Saturday preceding she had started to sit up with a missionary sister who was expectant.

I was so excited that I didn't sleep all Saturday night. After the doctor came she began to have a very bad time & he gave her hyoscine—which put her out of her head—i e she didn't know what she was doing & she fought so hard, that I was sore for 2 days afterwards. . . . What did you have to pay for a Md of s g Cossipore sugar? and did they send it V P P? I have to pay 2 Rs a bag in Ferozpur!

But more than the ascending price of sugar was affecting the life of the Wherrys in India. Subscription to their schools was falling off, in spite of need for its increase. It impelled the father to write to his daughter-in-law, Marie (March 5, 1915):

I am sending the enclosed [a brief in behalf of the Women's Christian medical college of Ludhiana, whose primary object was the training of Indian Christian women as medical missionaries for India] to ask whether you could not organize a Ladies Auxiliary to aid the medical college in the town where your husband was born. . . .

MARIE attended to this.

Wherry was busy moving his belongings from Cincinnati's old hospital downtown to the recently completed new structure—the creation of Christian R Holmes—on the hill. In it, Cincinnati's renascent medical department of the university—a hospital, two clinics and three laboratory setups

 previously scattered over widely separated segments of city soil for the teaching of the students—was being collected in one spot again. With larger influx of students and larger teaching responsibilities, it took much of Wherry's time and his personal scientific studies were pushed aside. As spring came he needed rest. And so to San Francisco and its dwarfed world's fair and to sit again upon the shoulder of Mount Tamalpais. Before he got there his mother wrote him (March 14, 1915):

I try to imagine you and the children in that nice home that was your aunt's. We have had a great deal of rain which of course makes plague worse. Yesterday (Sunday) while I was sitting on the veranda, 11 funerals passed by on their way to the Mohammedan cemetery which is behind the Women's Medical School. A boy who attended my little school got down with it and Dr Orbison treated him with iodine and he got well. Dr O has cured several people by using this treatment. One or two drops are taken inwardly & it is applied to any outside buboes also. I think the Salvation Army in India discovered this cure. . . . We have been warned by the Police to be *armed,* so Nellie left her pistol with her father. He is treasurer of this Station so keeps a *safe* and he has locked up the pistol in it! Two men who were caught for robbing and killing were hanged in our jail last week. An old Christian man who wanted to see the sight got a ladder & climbed up on the roof of the med school which is just beside the jail. He was arrested. Several Sikhs were arrested here who had bombs & materials for making them—one exploded and so they were caught. . . . The young men who had a hand in throwing that bomb at the viceroy in Delhi were hanged, but one of the principal ones is in America. It is a pity they can't be arrested over there.

Evidence for the truth of her letters was usually furnished by clippings. So with this letter there came one making Commissioner Booth-Tucker sponsor for the iodine therapy. Local Mohammedans had passed a "regulation" expressing "their absolute loyalty." "These were the Sikhs," mother wrote on the clipping. Then the official count of the plague dead. In February, 23389 had perished in the Panjab. Indicative of her

A FAIRY-GOD OF CHILDREN,
CALIFORNIA, 1915

 lighter humor was another excerpt from the matrimonial column of the local newspaper:

Wanted—A suitable match for a Bunjahi Khatri girl aged 16 years. She knows Gurmukhi, Hindi, Bhasha, Urdu and somewhat English and well versed in household affairs, and in fact perfect in every respect. Only those having European qualifications of Khatri caste and also widower can apply stating ages of children.

April 6, 1915, she reported further on the criminal state of the nation:

I don't know if I wrote that we were invited to attend a prize giving over on the camping ground. Over Rs 4000/ of Gov't money was given away in prizes to men who helped in the capture of some Sikhs who shot a constable &c. One got Rs 250/ because he caught . . . a murderer. That man & another were hung in our jail grounds. They gave 5 men Rs 250/ prizes and one old woman & a little child got about Rs 50/ & so on, altho this woman's child was so wounded by shot that it died.

WHERRY returned to his new laboratory in Cincinnati by middle summer to engage the *Entamœba buccalis*. It was an item of public discussion because C C Bass (thirty-nine, self-declared Mississippi "piney," who had made Tulane authority in the protozoal infections of man) had discovered it a constant find in the dirty mouths of pyorrheally affected individuals and had attributed to it active participation in the disease. Hitherto it had been considered only a "saprophyte" living happily in the muck. Because of Bass's work the treatment of pyorrhea, both locally and systemically, became that of amœbic dysentery; and ipecac, emetine and quinine were administered.

This mouth amœba had never been cultivated in the laboratory even though direct smears indicated that plenty of the animals were present. Wherry wrote [*51*]: "It has apparently been conceded that the *Entamœbæ* are so parasitic as to be non-cultivatable. This is probably not true of any parasite. When we fail to cultivate an organism it simply means that

we have either not furnished it suitable food or are unacquainted with some physical factor which influences its metabolism." It was such broad philosophy that underlay all his work. He had been studying the total parasitic inhabitants of the mouth but was after the protozoal types more specifically. "Quite a series of attempts" with media of different composition yielded him nothing. Now he found one that furnished the "suitable food" called for in the above equation. It was modification of a medium recommended by W Blair M Martin. Wherry said he had "been particularly impressed with his work." It consisted of agar-agar (Japanese seaweed jelly) mixed with sodium phosphate and "rich in ovomucoid" —nothing far removed from the eternal egg diet upon which Wherry had so often and so long fed his own stock. To it he had added the fluid which collects over the lung in pleurisy, allowing the mixture to "solidify in the slanting position for a night," as is the custom of bacteriologists; whereafter, he permitted "the water of syneresis to collect for a day longer." (This reference to "water of syneresis" bears noting. The bacteriologists had long called it "water of condensation," which it is not. Wherry gave the matter right explanation—a fluid squeezed off by the more solid hydrophilic colloid.)

On this substratum the *Entamœba buccalis* "survived." So did another protozoön never before cultivated, and found in dirty mouths and on other mucous surfaces, *Trichomonas intestinalis*. But they did more than this—they *grew*. It was particularly noticeable in "the water of syneresis." In this Wherry found the second element of his equation, that "physical factor which influences metabolism." It was all a matter of correct oxygen pressure. Said he of his experiments: "The protozoa grow best under aerobic conditions, while the bacterial flora is almost entirely anaerobic." The startling application to the problem of bacterial culture which he was to make of this generalization was to come forth shortly. In the meantime he deprived his *Entamœba* of air by sealing it under a cover glass. In half an hour it went slimy and passed into "a morphologic type such as one most frequently encounters in preparations direct from the gums." Infection of host, in other words, was infection under "anaerobic" conditions and

 something far removed, in consequence, from the circumstances under which the organism "grew" best.

Wherry at once applied his conclusions to the cultivation of a "diplococcus" that had evaded all laboratory method. Bacteriologists had long squeezed the blood of their own fingers over culture media to make the micrococcus of gonorrhea feel more at home; but even so had had but disappointing results. "Most of those who have worked with the isolation of the gonococcus from exudates admit that its cultivation is attended by many difficulties and uncertainties," said Wherry [*52*]. Following "no results" with a "number of such media" he described his success in four instances of the disease in children and one in an adult. It was due to the use of Martin's culture mixture, he said. Fact was, that this had not been the large variable in the total picture. What was necessary was provision of a right air pressure. "Gonococci thrive only at a partial oxygen tension." When incubated under ordinary circumstances, even Martin's medium had yielded "no gonococcus colonies at all"; but Wherry's "control" tubes, hitched in tandem to freshly inoculated slants of the *Bacillus subtilis* to eat up the oxygen in the tube, "yielded hundreds."

It marked another triumph in bacteriological cultivation. But Wherry saw (in his two-page paper!) far beyond. "The question is, are the aerobic strains heretofore isolated the gonococcus?" (meaning the germ capable of producing disease). "Inoculation experiments performed on man answer in the affirmative." Here he traced back to the ante-bacteriological period when the great John Hunter had infected himself of the disease. "Then we must assume that while the majority of the gonococci are *microaerophiles,* a few become adapted to aerobic growth." Ever dubious of the scientific value of therapeutic evidence, Wherry had this clinical fact to support his contention. Chronic gonorrheics who had not cleared in years after all types of "antiseptic" treatment with permanganate or silver, healed promptly after baths in hot water which did naught but bring oxygenated blood to diseased parts. But Wherry was thinking even more deeply. He concluded: "Growth under partial oxygen tension may give us a different antigen" (a different producer of an antitoxic body).

More detailed report (eleven pages!) followed [*54*]. Here

Wherry discussed what had been done on "the respiration of bacteria," laying special emphasis on the work of those who had shown "that the optimal conditions for the growth of any single species do not depend so much on the presence or absence of oxygen as on its tension." Here his Beijerinck (out of Chicago and Holland, it will be remembered) was pointed to as Number One man, for it was he who had acquainted the world with the *microaerophiles*. "It seems remarkable to us that greater attention has not been paid to the oxygen requirements of parasitic bacteria," wrote Wherry. "Recent experience has suggested that the cultivation of many of the unknown viruses of infectious diseases may depend more on the presence of the right oxygen tension than on the composition of the artificial medium." Whereafter he recorded "the details of *our* discovery that the gonococcus is a partial tension organism." The "our" is italicized because Wherry discovered many things and many principles in his life; but only rarely did he so frankly call himself the author. It was more common practice for him just to hand the fruits of his tree of knowledge to anybody standing around the place.

He proceeded next "to describe a partial-tension clostridium and a partial tension bacterium from a human knee joint resembling *B abortus*. None of the three organisms will grow anaerobically (that is to say in the complete absence of oxygen) but they throw off aerobic variants from their partial-tension growths." Now Wherry showed "that *Leptothrix innominata* of the human mouth has a very wide range of oxygen tension," and recorded observations indicating that "*B typhosus* becomes adapted to partial tension growth within the body."

As already detailed, he had thus made the cultivation of the gonococcus "an easy matter." The clostridium, growing quite naturally at partial tension below the (fully oxygenated) surface of his culture medium, he teased into life under aerobic conditions by breaking this surface and allowing the organism to crawl upwards. The descendants, now used to the fresher air, would then go on happily when transplanted into like circumstances elsewhere. For his bacillus of typhoid fever he noted a growth, under aerobic conditions, of "thousands of colonies"; but under partial-tension, of "millions." Anae-

 robically he got hardly any. For the bacterium from the knee joint he got growth neither aerobically nor anaerobically but "thousands" in the intermediate zone; for his *Leptothrix* (isolated from the human gum line) he got no growth aerobically, some anaerobically but best growth at partial tension. In the last named instance he had not only shown that partial tension was optimal for the growth of the microörganism but had actually cultivated it for the first time; on which account he made of his findings a separate paper [55].

A "discussion" brought these laboratory experiences to a close. Such "theory" of disease as he expounded is rarely read, in consequence is hardly known. Wherefore it is too frequently disparaged; what is worse for a sick world, unapplied. "The majority of bacteria actively multiplying within the tissues of a host are adapted to a pressure of less than 21% oxygen. They exist under partial-oxygen tension," he said. ". . . What effect this observation may have on the cultivation of hitherto unrecognized infectious agents remains to be seen. . . . The fact that *B typhosus* failed to attack glucose under partial tension but attacked it vigorously when grown aerobically is certainly worth considering. . . . Is it not possible that the partial-tension mode of nutrition *in vitro* is more nearly that which the microörganism follows in the body of the host? If so, does failure to take this into consideration account for our inability to recognize toxine-production by many species *in vitro?* Does this mode of nutrition build up a bacterial cell body of very different chemical composition from the ordinary aerobic and anaerobic strains we have worked with in the past?"

He ended with reference to the work of Bordet, Rowland, Rosenow and Beijerinck supportive of his views. He was back in the very fundamentals of biological existence—the drama of life living on life, and the "variations" assumed by species as the conditions for the battle were changed. In conclusion he quoted Beijerinck: "Variations in oxygen pressure above or below that most favorable to vital function are chief factor, and these ferments [Beijerinck used the term in Pasteur's sense, as synonym for microörganisms] only continue to display constant specific characters when continuously cultivated at

a certain oxygen pressure—otherwise these characters disappear and new ones originate."

WHILE thus engaged, 1916 opened and Wherry received this Christmas letter from his mother (December 25, 1915):

Papa had a carbuncle cut out of his back just three weeks ago & he has been in bed ever since. They dress it twice a day & put such a big pack of cotton on top that he cannot lie on it . . . We had a good many callers & several Mohammedans told me that they were praying for his recovery. I let 7 Hindus go into the bed room to make their salaams. They brought 2 large brass trays full of apples, oranges, sweets, nuts &c. I gave most of it to the servants & some of it to the Christians . . . Nellie still expects to go home in March unless they begin to blow up ships going via China & Japan . . . With 6 servants, there is no one who can do nurse's work! cook, kit, sweeper, bhisti, gariwalla & watchman. The latter sleeps all night. Last night I saw an old white horse filling himself with grass from our garden. He and buffaloes & their calves eat our few flowers, too. 27th Sad news at noon today of Mr Kelso's death. I think Jamie & John would appreciate a letter from you, Will. Jamie you know is Prest of Allegheny Semy, Pittsburg Pa & John is a Prof at Wooster College. Alec has a church some place in Pa. Mary is teaching at Northfield and Bessie is here. She studied nursing.

Two weeks later she could report that "Papa is now able to be up" and continued:

. . . A young Eurasian has been attending to the dressings. She has taken the regular course of medicine here but Govt doesn't call anyone a Dr with this degree . . . Every day nearly, orders come for his books. He has a young man to attend to the book orders. It sounds big but after all hardly pays, as things are gotten very cheaply. . . . Your papa is now here on the veranda trying to make the wick work right of the little oil heater you gave us, Will, as we were leaving San Francisco. I think it needs a new wick put in which we have. For a tin of Snow Flake oil which is the best we can get here

—American oil—we pay one dollar 50 cents. A tin contains about 4 gallons. That is pretty cheap I think. There is lots I *might* tell you but can't on account of the Censor—you would never get it. We are safe tho' so don't fear for us.

A few days later the father wrote himself to "all the children in America." Wherry noted upon it for the ultimate recipient: "I expect you will get this letter last of all. When you are through with it please return it to me unless you particularly wish to save it yourself." This was the father's message (January 11, 1916):

It was hoped I should be able to preside at Annual Meeting of the General Committee of the Ludhiana Medical College, that I would be able to eat my Christmas dinner in Kasur where there was to be a family gathering & that I should be able to attend the General Assembly of the Presbyterian Church in India. But alas, not one of these events was open to me. . . . I had long wanted the *Modern Bible* but the separate parts were too expensive for me. Aunt Sarah was here over Sunday. For a lady of 67 she looks as if she were fifty. She is fond of camping & spends most of the winter in tents. The work at Kasur is booming along apace. During the year the way has been opened to four regiments of Christian soldiers, about 70 or 80 recruits have gone from Frank's [McCuskey] people. It is a great thing for the Christian community. . . . The Lord bless you all. We rejoice in your prosperity and I have been specially pleased to hear from Almena that she has taken a hand in the Persian mission.

Wherry interrupted his so fundamental observations on host-microörganismal biology with a note on the *filterability of the Bacillus bronchisepticus* [56]. It was old stuff to him. He wished merely to see to it that honor was given where honor was due. Several "new" microörganisms as the cause of infectious disease in animals had been described. They were identical with the organism which Theobald Smith had discovered responsible for an epidemic form of pneumonia in guinea pigs almost two decades ago, Wherry pointed out. He did not mention his own isolation of the *bacillus pestis caviae* one decade ago. The filterability of the bacillus had been stressed as discovery. "It is only fair to call attention to the fact that

Smith casually noted this and asked me to go over his observations. This was done." Which merely meant that scientific progress needs to march back at moments—to 1902.

A second interruption came as appeal to him to pass judgment upon the findings and ideas of Charles Alfred Lee Reed. This abdominal surgeon (ex-president of the American medical association and a doctor whose activities had carried the name of medical Cincinnati far beyond its street-car termini) had noted that three epileptics ceased in their attacks after excision of the large bowel. The observation had led him to conclude that the absorption of poisons from the bowel, or the invasion therefrom of the blood stream by pathogenic bacteria, reaching the brain, gave rise periodically to the convulsive seizures characteristic of the disease. A hopelessly ill contingent was flocking to his doors ready to undergo the so serious operation if there was prospect even, of relief. Reed had long been hated of his confréres; and his "success" in the newly created operative field did naught to assuage this hate.

To ground more scientifically his clinical deductions, he had sought for a microörganismal cause in the blood stream of his patients; and had found it—the *Bacillus epilepticus*. An assistant had helped him to the discovery. Unhappily neither of them knew much of the trickiness of bacteriology or of the highly developed special knowledge required in 1916 of men with opinion in the field. Reed had put his head in a noose, and a mob was crying for someone to tighten it. Wherry was asked to be the man.

The story ended in a (two-page!) report [57]. In six patients, picked of Reed, Wherry made cultures of the blood, failing in all to isolate the organism which Reed had claimed the causal factor. Whereafter he examined Reed's own culture giving opinion that it was nothing but one of the ordinary air-blown bacterial contaminators that harry the working hours of every bacteriologist not always and completely onto his curves.

For Wherry it was the unhappy ending of a blue day; for the crowd in general, a pretty hanging. What it did not see was that in throwing out the dirty bath water (to use a German figure) a pretty baby, too, perhaps, had been flung in the gutter.

IN India by April, the European war compelled the father to be "acting principal of the school and the college." Mother explained how "a good many people who had intended going to England or Scotland wanted to send their children to the local schools." From her own side she could report that she had "varnished most of the old furniture so that it looks new, and you will perhaps be surprised to hear that we have had electric lights put into 6 rooms. India is advancing." The war situation had brought the military to her summer abode in Mussoorie and she reported:

There are quite a number of English soldiers up here. I saw about a hundred march into the Church of England on Sunday. Only 6 came to the Kellogg Mem'l Church [Presbyterian] who of course were dissenters. . . . Yesterday we got a telegram, telling us of Dr Charlie Newton's death. He was the second one to die of us four who came out 47 years ago on a sailing ship & we were the last who ever came to India in that way. . . . I wonder if you get all our letters? I try to be very careful how I express myself when I write! as several of my letters had bits scratched out or cut out. Our police officer has been transferred to Jullundur so we'll not hear so much of what is going on around. The conspiracy trial is over. A good many were sentenced to death & some transported for life, &c, &c. . . .

In July she was checking up on the censor: "I enclose 4 clippings & a programme. Are they all in this letter?" Whereafter she listed the botanical triumphs about her house:

22 pots & tins of the most beautiful Begonias that I've ever seen. On some a double flower & a single one on the same stem. We have 3 fuchsia plants, on one of them 39 buds & flowers. . . . a great many geraniums in bloom too. We found 3 small fir trees and we also planted a walnut tree. We find the electric light very much cheaper than kerosene. For this last month our bill for the meter & electricity was 60 cents. Just think of that! . . . I have canned some pears & peaches, and made raspberry jelly and apricot and peach jam. July 5th Yesterday the Am Missionaries met and celebrated the 4th, mostly by eating. . . . We were glad to get those little pamphlets, Will, that you get out. My! how learned you are! Most of it is beyond my comprehension.

She added to these exclamations further notes on crime—knowing full well that Wherry's love of it inflamed his imagination quite as much as his struggles with the occult of science. So, all about the newly installed women as police; the unearthing of crime by the military intelligence; the tricky methods pursued by detectives in capturing "thugs"—an Indian designation of their kind, by the way. For July 17, a party had been made of old friends, "to celebrate our 49th wedding anniversary."

Wherry now received word that his capable sister Nellie, long a teacher in India, had arrived in Chicago. She was on furlough, but her greater interest in things American was soon to set her at work in our own war manœuvers; thus she was destined never to see India again. After the War, Wherry was to take her into his own home. "I owe her that for what she did for me in college," he said.

Mother changed from one letter paper to another to write:

That other paper is so rough, I give it up. I am sending 2 newspapers printed by the Am Methodist Mission. Please let Dr Nast see them. . . . No doubt you are very busy. We had rather an exciting time last week. We discovered that our chokidar was covered with itch. Then Lillie found our Khidmutgar lying on the dining room floor, unconscious. Your father straightened him out & they carried him to the kitchen. After a while he came to & got a knife. We thought it was an epileptic fit but know now that he must have drunk something. Much love from your loving Mother.

In this summer the career of U S's evangel of prohibition, John G Woolley, had closed. For a year past he had been preaching the cause in Skandinavia. But moderate success had followed upon his efforts, because Danes and Norwegians liked Madeira and port with their fish. Nor had success been greater in Portugal and Spain, where they liked fish with their Madeira and port. The strain of it killed him. His son, Cincinnati's pathologist, journeyed overseas to bring back the body with much difficulty and bribe. Wherry's father wrote (August 18, 1916) that he "grieved to hear of Woolley's sorrow." Himself, he had thought that one of his missionary associates might be on the way out with a cancer of the

stomach. The patient had gone to Dr Wanless of Míraj who told him he had sprue! "He was sent up to Mohabaleshwar to eat strawberries—nothing but strawberries! He immediately began to recover and within six weeks returned north practically cured. I was reminded about what you said of American doctors not being able to diagnose," father concluded. A postscript said:

Your account of your discoveries is very interesting. I want to leave the Burbank books with you until we return home. But there were 3 vols separate & marked as a gift to Woodstock College. These I want sent here.

IN October of 1916 Wherry submitted another paper [59] to Hektoen (*The adaptation of parasitic microörganisms to a lowered oxygen tension*) and promised him a second [60] (*The influence of oxygen tension on morphologic variations in B diphtheriae*). After accepting the first, Hektoen accepted the second, sight unseen (January 9, 1917): "Thank you very much for the article you are sending. We are always glad to get articles from you. Naturally we desire the best." Besides which compliment he penned another in his signature: "Most cordially, your, L Hektoen."

In the first of the above papers Wherry cited his former efforts "tending to establish the generalization that many, if not all, endoparasites become adapted to a tension of oxygen below the atmospheric." Most of this (seven-page!) article dealt with his experimental study of a streptococcus but a precedent portion with the better growth of two animal forms (a filaria and a herpetomonad). Reduced oxygen pressure had favored the growth of the filaria. "It may help to explain why the embryos of Ankylostoma (hookworm) and Necator thrive best in a sandy soil," Wherry said. The herpetomonads had grown both aerobically and under partial tension, but better under the latter circumstances. Their motility too, generally assumed to be an index of their vitality, appeared greatest under those conditions of oxygen pressure most like those under which they had been grown. These were expansions of experiments made earlier [53].

He had retrieved his streptococcus from an instance of prostatitis. The ever conscientious observer added to its history this parenthetic warning: "It is not claimed here that there was any connection between the organism isolated and the condition of the patient. . . ." From a single colony—in bacteriology each such is presumed to be the family born of a single organism of fixed type—Wherry inoculated a deep tube of culture fluid. To his surprise, growth occurred at *two* sharply defined but different levels in his column of "soup," a first near the top and a second, near the bottom. The organisms living at the top obviously liked some air; those in the bottoms, shunned it. (Wherry said that the latter were *aerophobe*—air fearing—which so-descriptive term, either Beijerinck or he invented.) A single "strain" had given rise to two totally different biological products! Here is how Wherry reacted:

A similar phenomenon has been recorded by Wittneben. We were inclined to believe that Wittneben had been working with a mixed culture. It seemed extremely improbable to us that the culture of a single species, all the individuals of which were grown under the same conditions, could be composed of descendants adapted to such widely varying oxygen requirements. Observation has reversed our preconceived ideas.

Wherry transferred his pure bred microaerophile and aerophobe strains to new culture grounds kept under identical conditions of air pressure. Both "tended to throw off variants," Wherry found. And now he injected each of his two strains into the circulation of animals. His findings were "inconclusive," he said. Fact was, the aerobic strain had not diseased his animals; the aerophobe produced "marked congestion of the tissues about the joints which were full of bloody fluid." A rather violent picture of acute rheumatism the bystander would say! And rather startling proof that microorganisms tend to localize, to grow and to make sick those portions of anatomy where lack of oxygen and therefore optimal conditions for their growth are most apparent.

Pressure of oxygen again showed itself the main factor in the production of the various "forms" of the diphtheria bacillus. Many such had been described—long and short, pyri-

form or conical, branching or not, cross-barred or not, with or without polar granules. The alphabet had been called upon to designate them and particular types had been regarded as so characteristic as to identify the organism. Said Wherry: "The partial tension cultures showed much more luxuriant growth than the aerobic . . . Bringing the bacteria out of the tissues at partial tension enabled them to grow faster and they went on to the formation of barred types, whereas aerobic cultivation yielded chiefly the small, solid staining type." Thus was explained "the occurrence of various morphologic types of the diphtheria bacillus in a mixed culture from the lesions of diphtheria." It could be understood "only when one appreciates the influence of oxygen on the rate of growth." Then, as indicative of how clearly he saw the whole problem in nature, he concluded: "In mixed cultures from the throat the morphology . . . is probably modified by chemical products of growth as well as by the reduced oxygen tension resulting from such association."

X

WHERRY was at work upon these "chemical products of growth" as 1916 passed into history. The new year was to bring war for U S A and other confusions. Early in February his mother acknowledged "my 50th anniversary presents from you both." She told of her plans:

The silk is entirely too good for me; but I will obey Nellie's command and have a good Russian dressmaker make it up for me. I think she is Russian, Madame Savoilsky, and she does good work.

Description of other things in Ludhiana took more space. There was to be a wedding in the compound and all hands had been called on deck:

Your papa is to perform the ceremony with Frank's help. Margaret is to play the wedding march and Donald and Franie are to be flower bearers. Willie is to help serve refreshments. I, with Lillie's help, made the wedding cake and to-day 4 other ones & on Monday we will make 4 more . . . The day before, your father is to marry a couple of native Christians and in March Ebenezer Ahmod Shah is to marry Salome. Both are well educated and well suited for one another. . . .

From here the reader must guess for himself to which of the several principals further reference was intended:

The bride-to-be & groom are both in Ludhiana now as one of them has to be here 4 days before the wedding—there is a lot of red tape connected with a wedding here. Your papa used to have a license to marry but it had run out and he had to get a new one. Yesterday his Gov't permit came and has set the parties' minds at ease. . . . 7th Well, the wedding came off splendidly. The married couple went off in a Motor Car, no one knows where! Our cakes were very good. The papers now say that Am is going into the war. I only hope that none of

 our friends will have to go—the slaughter is terrible. Much love to Dr and Mrs Nast.

The father made his acknowledgment later (February 21, 1917) for "Roosevelt Books on Travels in Africa and South America (Brazil)." He had "written to the Burbank Society about the 9 missing volumes . . . subscribed for." Two pages of detail about these and further instruction regarding their care followed—a worry happily terminated in May by a letter from mother, saying the three volumes for India had arrived. Father inclosed a long "cutting on Kala-Azar" and added: "I seem to be busy—Principal of Woodstock, President Ludhiana Gen Com of Medical College, Manager *Nur Afshán,* Supt Christian Book Store & President & Chairman of a half dozen Societies & Committees." Of other portions of the Wherrys in India he said: "Lillie & Frank & Aunt Sarah are all busy making Christians in the Kasur District."

Though April made us part of the international conflagration, India, with three years of it, still allowed mother to write (May 18, 1917):

Things seem very quiet here and were it not for the soldiers and the papers we would hardly know that war is going on . . . John Ramditt who used to work with your father in his *Nur Afshán* office went off to Mesopotamia, is back on furlough and will marry Ellen Istifán and then go off again, perhaps forever.

To which she added these remarks:

You furnished Clara with some serum to cure her grippe, didn't you? She escaped an attack this winter and gave your serum the credit. It would be a fine thing if that trouble could be prevented. We enjoy seeing your articles but your *terms* are beyond *me!*

It was not a serum but a vaccine—cultures of organisms considered the cause of various pathological manifestations, killed, and injected. He had for years past given such treatment to the afflicted; and was to continue. Success at the special moment had brought him an unlooked-for lot of "testimonials." In the number of those who wrote stood Cincinnati's social foreground—Emerys, Tafts, Strietmanns, and a bevy of doctors. They were "much better and without pain"

—and grateful. Point is made of the matter, for from these sources were shortly to come sorely needed subsidies to his department. Though of the first established in the "new" school, Wherry's division was always to rest at the bottom of the financial ladder. Administrators ever on hunt for subscription to university cause seek motive. Well, here it is.

Mother told of adventures which had been his in the days of long ago:

The children went up the hill last ev'n'g to see some foxes that live in a hole in the ground. They saw two little ones and an old one but they ran into their nest. It is too soon for the monkeys as the crops have only been sown.

THE world vortex now engaged Wherry. Though long committed to the British side, the conviction had grown slowly and was not yet, even, without its reservations. He had hangover still of an active as opposed to an atrophied Christianity; and he was doctor—sworn to God to save and not to take life. He had seen the half of his family and his friends labelled "German" in disparagement; and made suspect, even though rooted in American soil at least eighty years. All of it somewhat foolish, he said; and smiled. But the national dedication did change him—into something yet more silent.

He volunteered; refused admittance to the regular army (forty-three with a leak in his heart) he asked assignment to the medical division. This, too, was denied him. So why not a dollar-a-year man, to see action in Washington? If you but knew it, his daily business with living fire was quite as hazardous as TNT. Thus for a season, he waved about in the nation's capitol some finely engraved and uncashed checks from "The Treasurer of the United States of America," for twenty-five cents each; to be estopped of court for gumming up the nation's bookkeeping.

Geo W McCoy (how, no one knows) got him a more lucrative job. August 14, 1917 Wherry wrote from Chevy Chase:

I have at last summarized our "acidosis" inoculation experiments. I'll send you a copy for comment and addition. My

notes are incomplete on the last rabbits and guinea-pigs. You will know whether the animals lived and were turned back into the breeding stock or not. The first of our series are the most satisfactory for I have a daily history of these with the urinalyses.

This reference was to experiments on susceptibility to infection, never published. A virulent strain of pneumococcus had been injected into a lot of healthy laboratory animals as opposed to an equal number previously exposed to cold, starvation or a "one-sided diet" (oats and water). Most of the latter died, almost all the former lived. Wherry continued:

I came on to the Hygienic Laboratory July 7th at the request of McCoy. I am "doing my bit" for 250.00 a month! I was to have done about six pieces of work but so far have spent all my time helping on the problem of the standardization of anti-meningococcus serum. This is some job as, so far, I haven't found any "immune bodies" in it apart from agglutinins. However Dr Wayson & I are now starting some protection tests which may yield a basis for work. The routine of the laboratory in the control of biologic "therapeutic" products is large and, on the whole, very well done. But of course they are up against a big problem in attempting to "standardize" such materials.

One of the men in the lab was ordered away and I rented his home north of Washington. Marie and the kids came on the middle of July & Nellie the first of August. We enjoy the place. I have seen most of the things of interest excepting a Senator & a Representative.—I will be back Oct 1st.

AND he was—much to the comfort of his medical school dean, Holmes. Teaching had long since palled upon the half of his faculty, and, away now in barracks, continuation of medical education and the production of new doctors were problems. By Christmas Wherry found himself one of the only three full professors left. With nothing but student assistants as helpers, he assumed responsibility for all bacteriology, pathology, laboratory diagnosis and preventive medicine! And met it!

In spite of a call upon him for his every waking hour, he made a new discovery. He had already observed how the different organisms to which he had applied himself needed for optimal growth an exact concentration of oxygen. Now he found them equally dependent upon an exact concentration of carbonic acid gas (CO_2, as the boys call it). The bygone year had showed "that if the respiratory CO_2 evolved by a freshly-planted virulent culture of the tubercle bacillus was removed, growth did not take place." The bacilli, though alive, remained in a non-reproductive state. His (four-page!) article [*61*] detailed quantitative study of the question. He made implantations of the tuberculosis germ from two different strains into test tubes in the regular fashion. But now he hitched these tubes by means of a tightly fitting rubber hose to a second, containing a fluid which would or would not suck up the carbonic acid gas as produced in the growth-process of the organism. When water merely was thus employed, the tubercle bacillus grew luxuriantly (because the CO_2 it produced accumulated and was not absorbed by the water); but when an alkali of some sort was added to this water (Wherry used barium hydroxide or sodium hydroxide) they grew hardly at all. But neither too much nor too little of the CO_2 might thus be allowed to stagnate in the atmosphere about the organism. Its total absence was inimical to growth; but thirteen percent of it, also. Best growth occurred in a middle concentration—around seven or eight percent. When tubercle bacilli are first set out upon fresh ground there is considerable delay before new growth begins. The "lag" takes days. Wherry explained the matter. Not until "both oxygen and carbonic acid gas pressures reach an optimal point, does growth start."

Wherry had announced a law. He had, moreover, been working with an "acid-fast" microörganism. How he was to apply his new-found knowledge to make another acid-fast organism grow (the bacillus of leprosy) never before cultivated on laboratory media, we shall discover later.

Two months after the appearance of these studies, Wherry sent a further paper to Hektoen. Four and a half pages were headed, *Cultures of a leptothrix from a case of Parinaud's conjunctivitis* [*62*]. The title needs inspection. Superficially

 viewed it was another case report—albeit of a disease not so common. But two discoveries lay in it. A *leptothrix* as cause of this eye disease had previously only been hinted at; and except for Wherry's own achievement in this direction, none had ever *cultivated* such organism in the laboratory.

The patient was a red-eyed boy out of Victor Ray's ophthalmic clinic; and since he got well fairly quickly that would, for most men, have been the end of the story. Ray noticed that certain features of the disease made it stand forth from the common run, and summoned Wherry. For one thing, it had spread beyond the lids; and the lymph glands in front of the ear had abscessed (as in *tularense* infection). The details coincided with that form of chronic conjunctivitis which Parinaud had described in 1889. No cause for it had ever been found. Such had been described but as commonly denied. Verhoeff had made the only solid contribution to the subject when he recognized as constantly present in the human tissues "a minute filamentous organism." But he had not succeeded in growing it outside. In Ray's example of the disease none of the commonly responsible organismal causes of inflammation in the eyes was doing the mischief, that was certain. Attempts merely to stain any kind of microörganism in smears and scrapings by six different methods failed in Wherry's hands. Also, he could grow nothing on all manner of laboratory media. Then he inoculated some guinea pigs and rabbits (to see if tuberculosis might be present) but they showed no symptoms of disease. Whereafter he scratched the infectious material into the eyelids of a mouse. It developed eye signs similar to those in the boy. From it, Wherry translated the disease to two other animals; and then from these he succeeded in cultivating a microörganism. His success came through application of the principles for growth that he had so long and so often stressed—a proper medium (egg-yolk) and proper atmosphere (partial tension or no oxygen at all). At a single stroke, as it were, he had both isolated and grown in the laboratory an organism never before isolated and never before grown (except by himself in the instance of Miller's leptothrix)—a *Leptothrix*. Now he returned to the patient, similarly to isolate and grow this organism out of the glandular swellings of the boy himself.

In the autumn of 1917 influenza broke out over the map of U S A. It had started in a naval camp; gotten worse in the military cantonments; had reached a crest in those barracks where doctors only were housed. The civil population was invaded, with nearly everybody (because of the many fatalities) having the jitters. From one hospital, squads of orderlies broke and ran when delegated to duty in influenza wards. The disease was going strong when Wherry volunteered.

The Surgeon-general of the Public health service answered Wherry's "letter and telegram" (January 12, 1918): "I desire to state that the kind of duty contemplated is only for temporary periods in connection with special investigations of certain diseases as meningitis." For proper induction to this work, Wherry applied to the U S civil service commission for appointment as "special expert in bacteriology and epidemiology." After four months he got it. But by May, "meningitis" had abated and the Surgeon-general's office suggested that trachoma (a Babylonian disease) be taken up instead. As to the new specificity of his "research," what difference did that make?—bugs had always been bugs to him. It took two months more of letterwriting and orders, signed by five different principals, before the where and how and with what, of Wherry's labors were settled. He believed Cincinnati (closest to his teaching obligations) the best place; the government decided that Pikeville was better—centre of Kentucky's age-old red-eye. June 8, 1918 the Department still believed that work there "could not be commenced at least until July 1st." Nevertheless Wherry was inspecting the field of his new assignment June thirteenth.

IN the meantime some other telegrams and special deliveries had arrived—as usual, not to find him at once. Medical Detroit was undergoing reform and its College of medicine and surgery was straining upward. N P Colwell (then the silent, clear-thinking pope of the American medical association's Committee on medical education) and H Gideon Wells (professor of pathology in Chicago's university) had been asked for counsel; and had suggested "Wherry of Cincinnati" as dean. The school had just "become an integral part of the

 educational system of the city under its board of education." Its deanship was not a bad offer—six thousand the annum and the post of pathologist in Detroit's largest hospital were there for the man. Officers and faculty wrote officially and privately in warmest appeal. One "had not taken to the applicants;" another wanted an "independent, out-of-town man, an original investigator who would put the college in the front rank." Albert P Mathews, about to join Cincinnati's faculty expressed that town's feelings: "I am getting heart disease waiting to hear whether you are to remain or go." After a visit to Detroit, Wherry refused. His letter to the temporarily active dean, W H MacCraken (June 20, 1918), spoke so clearly his views in matters academic, that it is quoted:

I did not send you a night letter as you suggested because I felt it rather hard to express my reasons in so few words. I shall find it difficult anyway. Originally I hesitated considering the position at all, because my leaving this school would cripple it at a time when it is extremely hard to get men, and when it has just raised my pay to $4,000. . . . I did not realize until we talked the matter over in Detroit that the Board expected me to teach pathology and bacteriology in addition to being dean. Such an arrangement would of course make me dean in name only. Furthermore, while it was stated that the dean would have full power, I came to feel that in reality he would be wise if he adopted a policy already mapped out for him—at least for the time being.

Now I might be willing to give up some of my time for research for the sake of developing a new scheme of education —where the biological and dynamic subjects of the curriculum are favored and nurtured more than the morphological— but in order to do so the dean would certainly have to be assured of full power. The question of his leadership would then involve tenure of office; and assurance of this, you must admit, rests on rather insecure foundations. [He had been informed that he would be appointed not for life but under a two to five year "contract."]

Lest my letter is taking a tone which I don't wish it to assume, I hasten to say that I was very much pleased with the treatment you accorded me. I thank you for the plain fashion

in which you discussed the situation. I have no doubt that you and I could have gotten along together famously.

Nor have I any doubt about your being able to build up the school—only it appeared to me that the process would be slow, still further delayed by the War, and I did not feel like giving up my line of work for such a period. This, coupled with the insecurity of the deanship, and pressure at this end both in the form of duty and further support for research work in my department decided the question finally.

He wrote me more jocularly (June 26, 1918):

I have decided to stay. I took Holmes's promise for the following: Salary $4500; 1000 a year for expenses of the dept; a promise that he would campaign for funds to create a chair in hygiene to pay at least $3000; likewise, two $500 fellowships; the promise, also, that he and Wolfstein would do their utmost to put the status of full-time teachers in the medical school on the basis discussed. . . . It is hard to tell you just why I lost my enthusiasm about Detroit. I think I decided to stay because it was easiest—to do so satisfied my desire not to be separated from those I like to work with (this includes you!) and my desire not to give up my toys and take up the big stick. Then, they told me that the exact status of this new Board had not been determined. They however meant well and perhaps everything would have been O K if I had gone. After I refused they telegraphed again saying that they would be willing to pay more if I would come. I guess they are in bad. Unfortunately they took the attitude (at least so it seemed to me) that *I* would be an effective piece of camouflage instead of really giving me the power & means to paint the scenery for them. How's that!

I go to Pikeville in July but don't know just when. In the meantime I am consuming numerous novels. Ervin [Dwight M, bachelor out of Wooster in Ohio, ardent worker in Wherry's department, later graduate of Cincinnati's medical school to become a distinguished West coast doctor] has written a note on diabetes. I believe he has the means of demonstrating the *glycogenic* function of the internal secretion of the pancreas and if his surgical experiments & analyses bear out the idea, he will undoubtedly have gotten nearer to the

 nature of diabetes. We cannot, however, keep him out of the army, for he is determined to go. I told him that he ought to solve the problem of diabetes first.

IN late August, Ervin reported thus to Wherry on the referred-to "note:" "A M A returned my article—but not so quickly as J Bio-Chemistry." Wherry was now on the trachoma problem in Pikeville. From there, on the typewriter —unusual method for him—he wrote me (August 2, 1918):

Things are going rather slowly today so I thought I would practice a little on you. I was glad to hear of your steady stream of patients who thus again exhibit their trustful nature. It is a great thing to have a Personality—if you can get into the right line of work. Even Kaiser Bill's would be useless if he were farming one of these here hills.

My patriotic work has so far comprised (seems to me, when one thinks slowly and carefully, that there ought to be a *z* in that word!) culturing and taking tissue from three cases of chronic trachoma. They are coming in slowly. Yesterday I grandly asked for my hotel bill and then discovered that I was not so rich as I had thought! Even so one can't be a spendthrift among these Pikers. If Uncle Sam ever decides to pay me for sticking it out here for two dreary months, I'll be rich.—Marie is in Cleveland today—she was put on that State milk commission. I think her appointment exhibited an unprecedented and unlooked-for amount of intelligence. Please excuse these long words but I must get practice by patient persistence. I could have written ten times as much by pen and I have Story Tellers' Pruritus in my desire to relate you a number of facts —but this does look neat and polite, doesn't it?

You should come down here and get the data on a problem in heredity. On a creek 19 miles from here live three families —about 12 households of from 3–12 members each—all of English strain. They have always lived here and have always intermarried. They average two born deaf-and-dumb per household. There is also one paralytic idiot among them.— Two days ago one of the little girls in the hospital who had been blind from trachoma for three years, opened her eyes and

cried: "I can see! I can see!" So the work seems very worth while. Well, I am exhausted!

Official explanation of why he had not been reimbursed for "expenses" came next day. A governmental chief wrote: "I have been unable to obtain a copy of your appointment and this is necessary in order that it may accompany your expense account to Washington."

How Wherry busied himself in Pikeville can perhaps be found in the files of Washington. These facts leaked. He transmitted trachoma from the eyelids of patients to those of monkeys. He thought, too, that he had seen at least, the causative factor in the disease. The only evidence of it, however, appeared in a letter to Marie, at the moment resident in Cincinnati (August 13, 1918):

I have run across an interesting little bacillus which is present in large numbers in the smears from the case of acute trachoma. It is demonstrated with great difficulty, for like *tularense,* it stains with about the same intensity as the background of the preparation. N/200 NaOH with a little Loeffler's blue, or fuchsin, brings it out. You will laugh at my excitement for you have seen it end in nothing so often. I made smears from three chronic cases today and will see if I can find the same bug. They came from a single family of twelve—all of whom are infected. They are certainly a nervy lot. Frowney, a girl of twelve, lay there and let Dr Raynor rub all her granulations off without a whimper.

Had a nice long letter from Mr Monroe yesterday. He wants a surgeon for Detroit and I advised Symmes Oliver or Dudley Palmer.

I picked up a sore throat somewhere; hope not at Ashland [where poliomyelitis was active] and that the children are all right. Don't worry, it is not much and I will get it with permanganate. . . . Be sure Billie is well before leaving for Michigan; but you must go, and as soon as possible. Try Empire and then look around. You always come out on top! Thanks for the check for sixty dollars; will bank it for my last two weeks expenses.

By September, Wherry's responsibilities were calling him back to Cincinnati. At least a fraction of the government ser-

vice appreciated what he was doing. Not only "interested" in his researches, satisfied with his progress and excited by the "possibility of finding the causal agent which has baffled the world," Russell Wesley Raynor said (September 3, 1918) that he "would be very much gratified" if Wherry would continue his work at the laboratory in Pikeville. "Is it not possible that you can do so?" he asked. Before leaving Kentucky Wherry wrote his daughter, now aged nine (September 11, 1918):

Thank you for your pretty letter written with a quill pen. That was quite an idea! Two hundred years ago quill pens were the fashion. In fact they did not have anything else excepting pens of split reed and these are still used in India. The old poets used quill pens and one of them must have been an ancestor of yours for you wrote me, "The water is very pretty. When the sun shines on it, it's silver." That's a beautiful idea, I think. . . . Some of the people here use very bad English for they say, "He's most ez tall ez I're." I may leave here Saturday.

ON arrival in Cincinnati the paper met him which was to be his last for a time. Eight pages told of *A respiratory stimulant and toxic substance extractable from lung tissue* [*63*]. It had been received by Hektoen in March. Said Wherry:

The interesting method we shall describe of producing accelerated respiration or death was discovered accidentally in an experiment with tuberculous tissue from a rabbit's lung. A piece of tissue filled with tubercles was ground . . . suspended in salt solution . . . injected intravenously into another rabbit which immediately fell on its side . . . and died a few seconds later.

He omitted relating earlier experiments during which he had thought the effects due to a toxine of the tubercle bacillus. Tests showed that "it played no part." In other words the extract of *normal* lung did the mischief. He explained how little was required. A given weight of rabbit lung was crushed in ten times its volume of salt-water. But "one cc of this crude extract did not really contain 0.1 gramme of lung tissue, for most of the tissue remained in the mortar."

Yet of the supernatant soup, "the fatal intravenous dose for rabbits weighing up to four pounds was 0.3 cc [5 drops] . . . " One animal after another succumbed in thirty seconds. "0.1 cc failed to kill but markedly accelerated the respiration." Extracts from all other organs (liver, kidney, ileum and spleen) except omentum, stood far below that of lung. The lethal substance "did not pass the Berkefeld candle N, and was removed by animal charcoal." He pointed to some of its other characteristics. Blood left in the lung was not responsible. When whole lung was heated, the noxious agent could still be extracted from it; but similar heating of the extract, destroyed it. (Chemists see in such fact the existence of a compound not broken into smaller bits in an absence of water; but "hydrolyzable" as soon as this is present.) When the same tissue was extracted twice, the second carried over "something capable of giving protection."

Wherry had described a material which when added to blood made it clot; and this clotting of the blood within the vessels had been responsible for the sudden death of his animals. The biological effect was allied to the "Theobald Smith reaction," and "anaphylactic shock." A few—like the great experimentalist, F G Novy—had long taught that these animal reactions, too, were the product of coagulation intravascularly. Wherry found all of them to belong in "the field of colloid chemistry."

Wherewith, because "unable to continue this work," he left its further prosecution to others. He had opened the way to a long series of biochemical studies. Through C A Mills chiefly, Wherry's lung extract was proved a compound of albuminous material with a peculiar type of fat, neither arm of which alone, as had previously been believed, made blood clot. Because derivable from all tissues (but best from those that Wherry had described) it was called tissue fibrinogen—formerly it had been designated nucleoprotein, fibrin ferment, thrombin, etc. In Mills's hands it was purified, made available to the surgeon, since, to prove of great service in stanching blood flow in many a "bleeder."

Wherry resumed his duties—doubled—as teacher. Also, there came more insistent demands upon him from the local draft board, the health board and his university committees. He hated the latter type of job, accepted appointment usually

because, he said, it "helped him to scuttle the ship." Still, these vagrant activities were not altogether unsatisfying, for they narcotized a mind rather distraught by the war. November brought peace, but even so matters continued disorganized. He stepped through a winter in which the mere meeting of the day's demands was sufficient. When spring broke, the Detroit college of medicine and surgery made new effort to capture him. W H MacCraken wrote (April 9, 1919):

You have been fortunate in escaping the trials of the past year —the Students' army training corps, financial problems, the maintaining of a fairly efficient teaching staff, the influenza epidemic.

It was complete description of what Wherry had not escaped. MacCraken asked, would he reconsider his refusal? If so, MacCraken was willing "formally to resign so that Wherry would not be put in the position of seeming to displace him."

This matter hardly disposed of, a second appeal came in. I was asked in July to bring the post of pathologist in the Saint Francis hospital in San Francisco to Wherry's attention. As "private" institution it had long existed as excellent example of private and individual care for the individual patient; thus withstanding the huzzas for "public" institutions which saw progress only in publicity, thorough regimentation of everything from an assignment of numbers to the patients to approved causes for their deaths, and in "organization" and an appeal to charity for half their cash. A hundred doctors owned this hospital, ran it at the decent figure of a first-rate hotel, kept the private lives of their exclusively private patients, private; and brought to their aid the best of an anti-"socialized" medical or surgical skill. James J Hogan (who in 1910 had recognized that blood remains in the blood vessels because a hydrophilic colloid and had introduced, in lieu of a donor, the use of protein—gelatine—injection mixtures, to see his principles of treatment in shock taken over in 1915 by Sir William M Bayliss and a gum arabic mixture) had quit the post of laboratory chief. The hospital staff (to which any state-licensed physician was welcome) knowing its value, wished it filled by the best available candidate; and would pay

for him. Wherry wrote me (July 31, 1919) out of Empire in Michigan where he had joined the Woolleys "to fish:"

Thanks ever so much for the large salaried job you steered in my direction. It was tempting and you must not think that I didn't appreciate it because I turned it down. San Francisco has not lost its charm for me; but I want to do more than diagnosis work and fear that what I might get into would resolve itself too largely into that. Sometimes, as you know, I get awfully peeved at myself for so continuously blundering about in the research & educational field.

Whereafter he swung into this essay:

I must quote here from Adami: "When Professor Bateson, from the vantage ground of his studies of the last fifteen years or so, begins to lay down the law regarding evolution, I cannot but help being reminded of Bombus, the bumblebee . . . blundering out of the fields and hedgerows into a greenhouse, and bumping its head noisily again and again against the glass because of its incapacity to drive into that head the fact that transparency and penetrability are not necessarily associated phenomena." That's my state. I apparently have the habit; and would rather hate to break up our associations in Cincinnati. And the situation in our school is growing better every day in spite of the fact that our catalogue makers [I was its editor!] revised the advanced standing rules backwards. But *paciencia!* We will get even with you when we get back!

We are enjoying ourselves very much. It helps a great deal having the Woolleys here. Paul, I expect, will stay out in Colorado all summer. Beula [his 3000 pound *Buick* automobile] behaved very well on the trip but broke her clutch collar at Connersville, Ind. That held us up for a day and the rat-faced garage man who fixed her up for $17.50 put her collar on hindside foremost. She is a wonderful car though, for in spite of this fact she sailed along merrily out to Barrington, Ill, up to Omena, Mich, to Old Mission & down here—then the button wore off her collar band and one could go into any old gear without pushing the pedal. Several years ago Zaza, the Seer of the Pacific, told me that in my old age I would make a discovery which would make my fortune. I am inclined to believe that I have made it. Why have a clutch pedal if one can shift

gears without it? Think of the saving in metal alone, not to mention the foot pounds in pressure! Of course there may be a slight difficulty in the way—if one were to crank the machine it might run him down. But then, that would develop agility in the next generation according to your teachings and thence-forward the Yellow Peril with its ju-jutsu tricks would be no more. And anyway, a man who cranks a machine is a damn fool.

Wherry was revising his contributions to Forchheimer's *Therapeusis of internal diseases* to comment thus upon his labors:

Marie, who is looking over my plague article (which *is* poor) interrupts my train of thought here by saying "Your spelling is *rotten*—there are *two m's* in *inflamatory* & *one l* in *travells*." How many things have been overlooked in the official marriage oath!

Marie had corrected the first line by penning on the side: "It is *not*; it is fine! Marie."

Telegraphic attempt to locate Wherry in Cincinnati had failed as usual, and Edmund M Baehr, just returned from service, had relayed the message to Michigan. Wherry answered him directly:

I was so glad to learn that you were back. The telegram was sent by post to me from Traverse City & came yesterday. As the telephone lines are down, I am mailing this note. Please wire Martin that I cannot consider the St Francis hospital position. It will take much more than a mere increase in salary to make me consider leaving our medical school which I believe is just on the point of developing into one of the best in the country. All we need is a little more team play on the part of those in the faculty who are interested in seeing real work done. In spite of various handicaps its growth is most encouraging. If the progressives get together and boost this tendency and really utilize the material equipment we now have, nothing can prevent our further development in the right direction. The more I see & hear of medical college situations elsewhere the more I am impressed with our good fortune in having a dynamic, forceful & resourceful dean like Holmes back of us. He really considers the school his child, as it is, and is not only

anxious about its nutrition & growth but is most willing to consult with others concerning its welfare. If we advise him to feed the baby sliced cucumbers, it will be our own funeral.

We are enjoying our stay here very much. The air & the water are fine. The Woolley family give Marie & me & the children the companionship we like and we will probably stay as long as they will let us run up the bill.

Well, old Ulysses, we look forward to the tales of your wanderings. P S You might tell Martin that if there is any difficulty in filling the job out West that I would advise them to get Dr B. He is so good that I wish we had him in Cinti. He is just out of service.

WHERRY returned to the home town to take a more than common interest in the amalgamation of its "public health" interests into one. The Cincinnati public health council was being born and now came up the unexpected picture of Wherry devising and correcting drafts of its constitution and by-laws! I found among these papers the script of one of his public addresses, never printed, revealing beyond expectation. This is how he could combine science, poetry, propaganda and inducement to the listener to follow the sawdust trail:

Over twenty-three times as much money is expended yearly by this city for fire and police protection of property as is expended for the conservation of health (20 cents per capita) . . .

A new tribe of savages was recently discovered in the interior of the island of New Guinea. Among them, swine are sacred and not uncommonly a mother will kill her baby to suckle a young pig! You shudder . . . But we, too, spend fortunes and rush experts across the continent to save our hogs from cholera and our sheep from anthrax . . . while we let our babies die. . . .

A worm, too small to be seen, forms the heart of the largest and most beautiful pearl. Nature is a strange artisan! At the other extreme there is born from a worm the *Wingèd Death*—the common house fly. Conceived in filth, born of the manure

 pile, it crawls over our cakes and secretly plants the seeds of disease in baby's milk! It does more to spread the germs of disease than any other known agency.

Early in the nineteenth century, the British in India learned of that mysterious, dark band of *Thugs,* devotees of Bhowanee, at whose shrine they offered up human sacrifice. His followers were initiated with solemn ceremony and taught how to strangle with the sacred cloth, neatly and quickly in order that no moan, no cry, no muffled scream should escape the victim. They travelled in bands and, overtaking smaller groups of merchants benighted in the bleak unpeopled wastes between villages, offered them protection. When a sense of security had stolen over the weary camp, when the silence of the night was broken only by the laugh of a jackal, the doomed were seized. "The sacred cloth was whipped around the victim's neck, there was a sudden twist, and the head fell silently forward, the eyes starting from the sockets; and all was over!" Champion *Thugs* were Futty Khan and Buhram. Futty Khan's list was 508 men in twenty years, and he was still a young man when the British Government stopped his activities. Buhram's list totalled 931, but it took him forty years to accomplish this.

In the United States alone, over five hundred men, women and children are strangled every day! Thousands daily, slowly, but surely, reach the point of suffocation! And their death is not a merciful one. With wasted bodies—hungering for air—they die with the hope of life still in their eyes! The annihilation of the followers of Bhowanee immortalized England. What are *we* doing to destroy the "great white plague?" . . . A victim of consumption "may expectorate from 500,000,000 to 3,000,000,000 tubercle bacilli in twenty-four hours!" In summertime this sputum of the gutters, the alleyways or our parks, is attacked by a horde of house flies which smear their feet in it, rub it off upon their wings, or devour it. Where then do they go? Shall they visit *your* house, to clean themselves upon *your* bread or to leave microscopic tracks on the edge of *your* baby's glass? That is not all, for having swallowed the germs, the fly acts as a culture tube for them. Now each "fly speck" may contain as many as 5,000 germs of tuberculosis! It has been proved experimentally that thirty infested flies may deposit from six to ten million tubercle germs in three days!

There is only one remedy against the *Wingèd Death* . . . Had man spent the last decade in mere "swatting" of the mosquito he would still be paying his former toll to malaria and yellow fever. The only remedy against the mosquito is destruction of his breeding place; and the same is true of the house fly. Most are bred in horse manure—the rest in the accumulations of the rags, paper, and filth of our alleys and gutters. How simple! Frame laws which will make imperative the keeping of such materials in fly proof receptacles, and insure their removal and sanitary disposal often enough to prevent the hatching of flies! But your Board of health must be supplied with sufficient inspectors to see that the law is enforced; and it must have your approval and the backing of your courts.

XI

THE autumn of 1920 marked the centenary of Cincinnati's medical college. Dean Christian R Holmes had planned its celebration—the scattered clinical and scientific branches of the old school had been brought together again in one geographic spot, it was financially in soundest state, he had housed the enterprise in a set of buildings that no other medico-educational enterprise in U S A could boast, the student body was of world-wide origin, and the men of its faculty were returning from the war—there was cause for jubilation. With the dean first, Wherry was second man to the university's "senate," and the dean had assigned to him the task of picking from America's medical thousands a few upon whom the laurel wreath of accomplishment might be bestowed. But before this collegiate gathering could take place, the captain died. The matter needed to be deferred a year; and was.

Invitation had taken me to lecture in Europe. There Wherry wrote (February 2, 1921):

I am holding my little finger for you, though in imagination only, for I have always had the greatest confidence in the little Boy Orator from Halsted St.

I am always surprised when a butterfly emerges from the tomb. You will remember de Santo, our Filipino from Mindanao. Give him a bolo and a G-string and he is a head hunter. A couple of weeks ago he presented a paper on hookworm disease to the class. He brought two maps of the hemispheres to point out its geographical distribution, mentioned every race and place, gave statistics, symptomatology, pathology and treatment in detail, and ended with a plea that medicine take greater interest in the prevention of a disease so world-widely disabling. His presentation was of the best, and the class gave him an ovation; yet I am afraid that but few felt the way I did after reading the autobiography of Booker T Washington. . . . Dr & Mrs Nast want us to spend the sum-

 mer in China but I don't see how we can afford it unless I could substitute there.

Headship of Cincinnati's university changed hands and Frederick C Hicks (fifty-eight, for long years a favorite of the students in the classical half of Cincinnati's university, an economist with understanding heart) came in. He continued Wherry in his place. It was the kind of "administrative" appointment that he loved—it had to do with policy and not bookkeeping—and so Wherry wrote his faculty colleagues (August 25, 1921):

Upon whom do you think we should confer honorary degrees at our coming centennial celebration? They should be medical men or men working in the related sciences. If you have a name to suggest, indicate in full the reasons therefor.

Almost no nominations were made. Wherry put forward a list all his own. On November 6, 1921, the University's president spoke in the great hall of Cincinnati's new medical school, "by virtue of the power vested" in him. For "eminent scholarship and public service," the title of *doctor honoris causa* to the following:

Charles Cassedy Bass (forty-five, first to grow malaria in a test tube); Mary Muhlenberg Emery (for largest faith in Cincinnati's medical future); Ross Granville Harrison (fifty, first to grow animal tissues in a test tube); Ludvig Hektoen (fifty-seven, for proving science as well as wheat to come out of the West); Christian R Holmes, posthumously (sixty-three, for being Cincinnati's second Daniel Drake); Edwin Oakes Jordan (fifty-four, for making bacteriology function in sanitation); Dean Dewitt Lewis (forty-six, for insisting that biological principles must be guide to surgery); Robert Williamson Lovett (sixty-one, for utilizing physiological law in the correction of deformity); Elmer Verner McCollum (forty-one, for proving that men may starve in the midst of plenty); William Snow Miller (sixty-two, for writing apocryphally on the lung); Frederick C Novy (fifty-six, for biology beyond its systematics); John Barton Payne (sixty-five, for being more than clerk in U S's Interior department); Joseph Ransohoff (sixty-seven, for knowing not only what but how to say the medical); Edward Carl Rosenow (forty-

five, as greatest disciple of a master, Frank Billings); Louis Schwab (seventy, because Cincinnati's graduate, physician and mayor); William Thompson Sedgwick (sixty-five, for proving that the man and not the thing makes the difference between an engineer and a plumber—he was so appreciative of his distinction that he ordered his burial in Cincinnati's gown); Charles Rupert Stockard (forty-one, for seeing men in dogs); Henry Baldwin Ward (fifty-five, a zoölogical encyclopedist who saw West in East, and East in West); John Clarence Webster (fifty-seven, for knowing obstetrics as physiology, and gynecology as pathology).

Nominated, approved of senate, but deferred, was B K Rachford (unrecognized till now for his scientific discoveries and too recently responsible for financial contribution to the university not to have the cause for his distinction blurred).

Public as opposed to private higher education thus proved for a moment, that it, too, could know its great.

In this year Wherry expanded his household. He had added sister Nellie, to whom he said he "owed" it, back in 1916. Now father and mother came out of India, all to continue in his house to the time of their deaths some years later († 1928, 1927, 1926). For a year, brother Frank McCuskey, sister Lillian and their four children furloughed with him. With his own two, it made for six juveniles about the place. One was stricken with whooping-cough. He inoculated the remainder of the lot and the elders prophylactically with his pertussis vaccine. All escaped infection except himself—the shoemaker had failed to sole his own shoes.

He broke his two-year silence in the public press with some articles. His love of all living creatures, his knowledge of the exotic, had gained for him the affection of Cincinnati's famed animal dealers—Madam Haller and son Louis of the Harz mountains canary vivarium situated on Vine street in Cincinnati. Impressed—after years—of Wherry's capacities, they would now commit their dying and dead to him instead of to the incinerator. Thus had come a Mexican parrot. He described in it a leprosy-like disease of the lungs [*64*].

Just another "case" report (one page long with two pages of illustration!)! In the light of later endeavors, however, a point of historic significance lay therein. He told of his

attempts to cultivate by partial tension and carbon dioxide method the acid-fast bacilli he had discovered in the lung. "Six months" of labor at the business had yielded him nothing.

Almost simultaneously he reported (twelve pages!) upon spray-borne bacteria as the cause of respiratory infection [65]. Influenza and pneumonia as the fatal consequences of ordinary "colds" were still much the subject of medical debate and C T Butterfield of the U S public health service had been assigned to Cincinnati for collaboration. Did people "inhale" these noxious organisms into their lungs, develop inflammation in consequence, and die? To reproduce the situation, cultures of influenza and pneumonia were sprayed into the atmosphere surrounding susceptible laboratory animals. Less infection resulted than most men thought. Authoritative opinion held air-borne bacteria not to get far below the neck. Wherry recovered his sprayed microbes from the very limits of the lung. Even so they had but rarely injured the host sufficiently to produce disease. "Since none of the twenty-nine mice became infected after inhaling virulent pneumococci, one may conclude that some predisposing factor must precede or accompany such an implantation of bacteria." The infested host had to be weakened to make the disease "take." Nice stuff for the medical philosophers! Just what is there to drafts and cold, to overwork and worry, to bad food and bad hygiene that allows so-weakened animals to cave in; the physiologically right, as in these experiments, to come through? Such query was fundamental.

The mucous membranes of both the respiratory and the alimentary tracts are constantly the garden plots of a "flora" of large variety. In the main, the flowers are "saprophytic" and just grow in the lush bottoms without harm to the underlying earth. But off and on, more wicked weeds appear and the soil itself is poisoned. This study had shown how even then, bad effects are the rare and not the to-be-expected consequence. The earth was "resistant."

Census on all the forms and all the kinds of microörganisms lying about upon man's mucous membranes was far from complete. Wherry had been newly inspecting the premises. So he added some new names to the list of established families [66]. In four pages (!) he described his isolation of, and

the biological characteristics of a microörganism that blackens decayed teeth (*B melaninogenicum*). He had found it not only in the mouth but in an "infected surgical wound."

I here recall a comment Wherry had made years before: "Cultures from the pus of these wounds smell for all the world like the surgeon's breath."

He grew out also, and described for the first time, *M minutissimus*. It accompanied commoner types of microörganismal infection. The life characteristics of *B duplex-nonliquefaciens* and *M reniformis,* already known as the inhabitants of the mucous membranes, he made more precise. The importance of this work lay in his differentiation of them from better known forms which they looked like. Wherry's brands were innocent and harmless even as they were mistaken for others which carried immoral connotation.

FOLLOWING the medical school's centenary celebration came a quick descent from admiration of the flowers of education to consideration of their fertilizers. Since Holmes's death, J C Oliver had acted as dean; but demand (and funds) for a "full-time" replacement brought Henry Page (fifty-two, Colonel USA, retired for disability) into the job. It was a tough one. For more than a decade past everything in school and hospital, from professors to scrub women, had just bowed down naturally to Holmes; Page believed in legal prop for the matter. The request irritated his board. Nothing else requiring reordering in the school, the curriculum was taken in hand—already a nightmare to the most bedevilled of university students. Page changed all morning sessions to the afternoon and all afternoon sessions to the morning. Two of the professors protested—their sinuses did not drain until late and they simply could not meet those earlier hours. Another question came up: What should be the policy of the faculty in limiting the size of every class admitted to the medical college? Hereat reliable witnesses affirmed that Holmes rolled in his sleep. January 31, 1922 a "committee" addressed a questionnaire to the faculty. Since Wherry's name appeared among the signers, the following high spots are excerpted:

What is the max no of students you can properly instruct?
How much time should teachers have for research?
Is time spent in research of greatest benefit to (a) teachers, (b) students, (c) college?
Should the entering class be limited to 60?

The answers to the "research" questions are omitted. As to the students, sixty could in no sense be taken care of, even fifty cluttered up things and forty might approximate a working base. (This meant a total of one hundred and twenty students for the four years; the faculty roster alone carried over two hundred names.) The matter was settled in open meeting. After two hours of discussion, the university's president who had come in for the occasion, said: "The Board will do exactly what you gentlemen advise. Your recent increases in salary were made possible by increased student receipts and will, of course, have to be rescinded." For ten minutes the faculty went into a huddle, deciding at its termination that a minimum of seventy-five could easily be placed in the next session.

In the summer of 1922 my mother was prostrated with a cancer and anemia. A letter to me out of Lakeside, Ohio, where Wherry had gone for rest, gave a picture of him as doctor (July 25, 1922):

I saw a report in the *N Y Times* about a "wonderful cure" for pernicious anemia. It is some compound of germanium. I know this sounds like advice from your country cousin who has read an ad in the Hickville *Courier-Gazette* but I cannot help feeling that it would be worth trying. We all love Mrs Leonard so much that we wish to do something. . . . Margaret [now thirteen] has been sketching, but finds water and rocks hard. She is fond of fishing and when we have gone out together she has had most of the luck—pulling in two large "sheep-head" just as we were about to give up. She is as much of a fish in the water as Marie and swims all around me.—You know I have my reservations, but Hearst somehow or for some reason is allowing Norman Hapgood to say some very plain things in his *International.* If you haven't seen them, look them up.

A week later he added: "I am mailing you *Our medicine*

men which you will like." Two weeks thereafter he wrote from Canada where he had motored (August 13, 1922):

I do wish that we could do something for Mrs Leonard's comfort. . . . We have had a lovely time on Lake Joseph. We are looking at several places that are for sale—two islands and three points. One island in particular is a peach. It is hard to find a good house, good boathouse, good wharf boats, canoes, pine trees and a beautiful view for our price but we are looking just the same.

A letter dated August 25, 1922 from Lakeside to which he had returned, showed him with a mad on; but humorous too: "I have sent the Board of directors a protest on the treatment of my department. I need to prove definitely, right now, whether I am a guinea pig or not." He appended what he called "an attempt to improve my mind." In a one-minute essay headed, *Evolution—Insect or Man?* he reflected upon the origins of the then so popular "vitamins:"

Insects have always chosen the germ of the seed in which to lay their eggs, for long ago the experimental method taught them that in it lay the food necessary for the growth and nourishment of their young.
Civilized Man (immersed in the conceit of his superiority) has for centuries thrown away the germ to feed himself upon the left-overs. Only recently, and by adopting the same experimental method, has *he* discovered that the insect was right.

He concluded: "Get Hearst's *International* for Aug, for the beginning of a good series on the pill peddlers by De Kruif. You will like it."

FOR play, he turned to a group of outlaws for whose gathering Edmund M Baehr had been chiefly responsible (associate professor in physiology, neurologist, ex-member of Ohio's board of charities and corrections, ex-service man). It had agglomerated about a table in Mecklenburg's—ex-beer—garden when week-ends, holidays or the summer closed the eating emporium of the medical school. Membership was voluntary and self-induced. Though the group could count

 but two "head" professors, it dared, nevertheless to hack at the oak stiffening as "progress" in Cincinnati's medical education. If the sclerosing process could not be checked, the whole thing might be chopped down, it said; and life begun anew with a sapling. The subscribers could still laugh. Before long its meetings were known as those of a "Black faculty" (so named of O V Batson, shortly to become the professor of research anatomy in Pennsylvania's Jefferson college).

By 1924, evening sessions were being called. Some fourteen got together to talk about all manner of things and to do as they pleased about some others. No organization, no constitution, no president, no program, no dues ever interfered with "business;" no name even. Baehr once called it "the Philosophic-literary-artistic, etc" society. Meeting at each other's houses, black bread, cheese and undenatured beer had usually been discovered by the temporarily active host. With time, some of the earlier members departed, to be replaced by a homeopath, two dentists, a painter, an architect and an actuary. At one time a dean of the college (A C Bachmeyer) was a member; and throughout, the assistant dean and faculty secretary (Frank B Cross). Other names to rise to fame were Shiro Tashiro (nerve conduction is associated with a burning process), Robert A Kehoe (authority in heavy metal poisoning), Gustav Eckstein (to read to this crowd first, the lives of his laboratory animals). All the men "did" something—the professionals because they were professional, the rest because they had ardor. Thus they crafted, sculpted, painted or wrote—by hiding Pegasus. Powerless specifically in any of Cincinnati's affairs, all could do something to the machinery—they frequently dropped tools into the running parts.

Wherry was qualified member under several designations. His love of the crowd came to expression in many a letter. To the pretty things he had so often done to illustrate his scientific articles, he added, for this group, some landscapes; and to his scientific essays, "stories." These tales should have been printed. Unhappily he kept the originals in a lower drawer of his hospital desk—and search after his death revealed that he had destroyed them. The themes of two are repeated. In one he portrayed the struggle of a Scotchman

marooned in the tropics; and the battle of his soul between the easy existence offered him there and the call to duty out of the home country. (Wherry was by lineal descent a Scotch Presbyterian.) The other (1930) was inspired of the kidnapings that governmental impotence was toying with. Wherry had caught his man. The item at issue was proper punishment. What more just than banishment to *Rat island* off South America, where the rodents swarmed over him to leave but the calcium of his bones!

In the summer of 1923 I had accompanied one of the members of this *catorce* (Cincinnati's great painter, John E Weis) into our Southwest. There Wherry wrote me (June 30, 1923):

I hope you are enjoying yourself in the riot of colors. I inclose clippings about the college which came as a surprise this A M. As you know, Blackfan has gone to Harvard & is taking McKhann with him. I presume Higgins will leave us next.

The clippings referred to an affiliation that had been consummated between Cincinnati's oldest dental school and the university. (It lasted only three years when the dental school closed.) Another was editorial on "Drifting at the medical college" in Charles P Taft's (chief among the donors to everything in Cincinnati's university) *Times-Star*. Why was Blackfan leaving? Why was Heuer (head of surgery) unhappy? Why was there "opposition to a progressive policy?" Holmes, who had resuscitated the great enterprise, was not dead three years and yet something was "standing between Cincinnati and the development of a great medical college here."

Wherry followed a week later with:

I'm worried about your patient Harkness [an instance of pseudo-leukemia that had been *x*-rayed]. Of course you hardened devils of general practitioners would lose no sleep over such a little thing as I am going to recount to you. But when you run off and leave a laboratory recluse the responsibility of caring for such a lovely fellow, it scratches through the surface of his uncalcimined soul when something goes wrong. For the past three days he has been feeling weaker and weaker. Now he walks with a staggering, spastic gait;

no loss of muscular power or tactile sensation; knee reflexes exaggerated; very unsteady on standing with eyes closed. Otherwise he has been getting along beautifully—his neck is still small and the itching has almost disappeared. He still has the profuse sweating. As I said, I am worried. I promised to acquaint you with the above facts; otherwise I would not have written, for I think you should shed the town completely for at least one summer.—With my best for all my friends and my worst for all my enemies, I am . . .
P S I cut out the vaccine & iodine for a while and increased the lemonade & Vichy. Is that the right thing to do, doctor?

A further report was made July 16, 1923:

I had Baehr down to see Harkness. He says, transverse myelitis at about the level of the 7th dorsal. The situation has not grown worse in the past week excepting, as you might expect, that his gait is even more spastic with some increased weakness in the muscles of the lower legs. Baehr did not think the vaccine had anything to do with the new signs but I have cut the dose down to ¼ cc once a week & will then give him a rest. I have written Baehr to remind him of the need for his next visit.

Wherry was busy these days treating all manner of disease, supposedly incurable but perhaps infectious, with vaccines of various kind. In this way he saw some twenty sick daily. How they clung to Wherry! They had been jettisoned for the most part by the more orthodox of the medical fraternity, steadfaster in their adherence to the articles of faith of the craft. So I saw the hopelessly ill weep when Wherry would depart the city for a week-end.

He published another paper (four pages!). While growing the cause of lobar pneumonia "in tandem with other bacteria, it was noted that it would not grow with a spore-forming ammonia producer" [*67*]. Since, after administration, ammonia is excreted through the lungs, Wherry "was inclined to believe that in addition to the expectorant action of ammonium compounds, they might exert an inhibitory action on the pneumococcus," as well, thus to account further "for the popular and apparently beneficial action of these salts in colds and bronchitis." He performed many experiments to

test this view, concluding that ammonia was such an inhibitor but only when in alkaline form (as ammonia water and not as ammonium chloride, for example). This made him urge alkalinization with the administration of ammonium compounds. Both the ammonia and the alkali were deserving of consideration by the physician bent upon checking the harmful effects of pneumococcus infection.

He added another observation. The discovery of "capsules" about the pneumococcus had long been one of the best methods for their identification. But they were hard to see. Wherry proposed a bath of acid of proper concentration to make these cowls show up at once; then if "stained," most contrasting pictures between microörganism and capsular substance could easily be obtained.

In these days Wherry stole increasingly into the attic of his house—to paint. He had turned, too, to oil instead of water color. The change had not gone well. August 28, 1924 he was on vacation and reported:

I have to confess to you that I lost my nerve for oil painting when it came to starting and left my fine outfit at home. It seemed too difficult for me to attempt. The fact is, I am lazy. That is why I like fishing; it is a prize form of loafing with a little excitement added once in a while. I had a good time in Wisconsin but am anxious to get at the bugs again.—No doubt you have heard of the plan at the university for popularizing science. I have been chosen to represent the medical school. I am out of any popular lecture scheme.

But he wasn't. He came forward handsomely to give five lectures on the contributions of bacteriology to the history of scientific thought. He had urged discussion upon his listeners. The result, he declared, was disappointing. Only one questioning mind had risen to ask: "Why do they put boric acid in babies' eyes?" His epistle continued:

Among the letters of recommendation for a new assist prof in my department is one which calls him "too independent minded." So I told McCord [his departmental associate in charge of preventive medicine] to go after him as we needed a little independent-mindedness in our joint.—Don't fall off any glaciers.

A month later he wrote me again (October 4, 1924):

Our latest Dean has packed up and left town. There are no definite rumors as to what comes next—though there is talk of giving Bachmeyer the combined job, partly because he would be a good man and partly because there is no other way to raise his salary. Personally I think him excellent.—Has your ethmoiditis lighted up again? Never mind—you can always come back to me knowing that I will cure you!

Baehr sent information on identical subject (November 11, 1924). His letter to me is quoted as outline of his mind and to explain why friendship between Wherry and him was so enduring.

There is a perfect wealth of painful news to tell; the town is buzzing over the keyhole revelations supplied them by our frightful press concerning our former medical student who had magnificent courage and poor advice and ran away with the man she wanted. Nothing has been omitted; our circulations are tingling with wish complexes encouraged, and with indignation over any one who dares break the rules we wish to break and dare not. Enough. If I knew where to find her I should send her an encouraging word.

The Dean has quit. More buzzing. Hell of a world, isn't it? I am growing to hate it more and more; not the world but the poor dirty creatures that assume the right to dominate it. —My own practice is growing slowly and surely (which is all you can say for the Alps). We are all in perfect health but a little concerned over rumors that you are not. If the headaches continue, come home and I will fill you full of chlorine which will put an end to the thing in two weeks (Excelsior laundry technic).—Wherry had most of us out to a smoker last night to meet an out-of-town visitor. One of the crowd advised him that there was no opportunity here for a live man. The party continued, nevertheless, with C A L Reed doing all the talking. . . .

I confess that it causes me anguish to search all this bunk out of the forgotten recesses in my weary brain; but I know for certain that you must do the same thing unless something is wrong with you.

P S *Feet of clay* at Walnut movie. Rottener than I feared.

1925 saw Wherry at the setting down of a philosophy of infection which, in a certain sense became his life's testament. It was founded upon the work of long years. Superficially he was continuing addition to practical therapy; but deeper down his "better clinical results" were the outgrowth of reasoned argument about the whys and wherefores of resistance to invasion by an enemy attacker.

Four pages (!) on *Gonorrheal ophthalmia treated with acriflavin* [*68*] started again as a case report. An infected eye, proved to be of specific origin by Wherry's own methods of culture, had resisted approved treatment for ten days, being still swollen shut and filled with discharge. Wherry laid over the eye, cloths saturated in strong salt water (a mixture of ordinary salt with Epsom salts) and instilled a dye, acriflavin. In three days the swelling had subsided, the eye was open and the pus had almost disappeared. But since bacteria could still be found microscopically, more intense and continuous instillation of the acriflavin was resorted to. In two days all discharge ceased and in a week the eye was well.

To the world, it brought improved treatment of just another patient. To Wherry, it was the clinical proof of scientific deduction. He had taken the cause of the disease into his laboratory, discovered there the conditions that made it live best, the exact concentration of dye necessary to kill it, and something of the circumstances which made it more susceptible to this throttling. A culture medium simply too dry would not raise his microörganism; so he had induced a similar unfertility in the tissues of the eye by removing the water by salting. He made this fact into a law by extending the truth of his observations on gonorrhea to other life forms —*B pyocyaneus, B mucosus, B coli.* "I have seen anthrax of the eye in man cured in 24 hours, staphylococcus infection of the eyelids, erysipelas and extremely edematous streptococcus sore throats subside rapidly when the accompanying edema was reduced" by "salt-wet dressings," he said.

How to raise constitutional resistance to infection by the injection of killed cultures of the organism had long, of course, been his goal and that of many other workers in bacteriology. All had injected "vaccines" to increase "immunity." Whether by direct route or more indirectly through stimulation of

 "opsonin" production that favored "phagocytosis" as per Metchnikoff's ideas—such had been the daily employ of Wherry since student days.

The clinical results achieved through vaccine therapy had been variable. Some doctors held them "good"; others, useless. These bacterial stocks had been made by boiling up the micro-organisms as so much soup. Wherry asked if other methods of preparation might not be better—perhaps the immunity producing properties of the dead organisms had been unduly changed by the way they were cooked. Could not they be killed without this drastic chemical change? Could not bacteria be "coagulated" by other process than that of heat, as by treatment with an antiseptic like formaldehyde? "From a study of the literature and from our own observations the treatment of bacterial antigens with formaldehyde leads to their detoxication without affecting their antigenic value," he wrote [*69*]. He cited his laboratory experiences in evidence. He had made immune to tropical dysentery (Shiga's bacillus) a large number of rabbits—through first injection of the animals with such a formaldehyde-killed culture of the bacilli. Thereafter he had given them lethal doses of the living organism. With the exception of the underimmunized, all his animals lived.

Now he applied his ideas to the cause of typhoid fever, succeeding here, too, in producing an immunity in men without the severe reactions common to the use of the commercially prepared (heat-killed) varieties.

His theology was presented as an address to Cincinnati's Ophthalmological club in December [*70*]. While entitled: *The use of vaccines and dyes in controlling infections of the eye,* it was statement, really, of all he believed to lie behind the universal drama of one life trying to live upon another. What I quote is practically all the paper (it was one and a quarter pages long!). Beginning with the facts which to his mind underlay the establishment of infection, he said:

. . . So far as the host is concerned, the body may be considered as a cylinder covered by skin and mucous membrane which have natural defensive powers of a high order; but also contain many weak points where parasites may establish themselves and, through adaptation, acquire the ability

to thrive in the deeper tissues—the tonsils, adenoids, mucous and sebaceous glands, hair follicles, etc.

The parasite must be possessed of ferments which will enable it to utilize the sources of carbon and nitrogen furnished by the host, and it must have a type of respiration, or acquire it through adaptation, which will enable it to survive in the relatively low tension of oxygen found in the tissues. It must find its food substances in solution or be able to produce chemical changes which will bring about a solution of the tissue; for under normal conditions the cells of the host . . . contain little or no free water. That bacteria cannot utilize body colloids unless in liquid form can be shown by growing them in a nutrient solution containing increasing quantities of a colloid capable of binding water, such as agar-agar—the rate of growth being in inverse ratio to the concentration of the agar-agar. Injury of healthy tissue resulting in local edema furnishes food in solution and hence a favorable place for the growth of bacteria, even the saprophytic.

From such theoretical backgrounds, Wherry divided what might be the cure-bringing methods of the doctor into such as prevented trouble and those best suited to meet it afterwards. Under the former lay soap-and-water cleanliness, the immediate sterilization of injured areas (here Wherry emphasized the employment of those death-dealing substances, which while killers of the infection did not simultaneously kill the cells of man, namely, the dyes), the immediate reduction of swelling (since it shut the air off the invading organisms to allow their better growth) and the removal of established bacterial nests (as in the tonsils and teeth). Under the latter lay immunization against infection. The external skins of his human "cylinder" should be made immune, and this immunity then be carried clear through. Take the water out of every injured spot, be it superficial or deep, to make mere life hard for the microörganisms; and then build up the host's total resistance. Phagocytic immunity "might be aided by *passive* immunization" (the injection of "antibodies" earned by another host—as the diphtheria antitoxine produced by a horse); but an *active* immunity earned by efforts of the host himself was better. To this end Wherry advised the injection of "suitably prepared antigens."

He demonstrated the soundness of his principles by reference to clinical experience. If his listeners cared to follow him, then they too would dehydrate, paint with Churchman's gentian violet or Benda's acriflavin (depending upon whether the invader liked his food sweet or sour) and prepare and administer properly trained "antigens."

XII

THE ideas in bacteriology that were Wherry's gathered unto him a long file of coworkers and "students." His first scientific walks had brought Lyon, McDill, Clegg, Musgrave, Woolley, Spelman, Agnes Walker and Wellman to his side. In Cincinnati he added O V Huffman (dean, later, of the Long Island medical college and belovèd practitioner of internal medicine to his death, 1937). 1914 saw him convert the medical student, B H Lamb, into a bacteriologically-minded practitioner. N E Wayson's affection for him then came to flower (assistant surgeon, U S P H S, he had just shown how stable and house flies carry *tularense*). At Woods Hole, Wherry joined up with Kite as two mercury droplets coalesce. In 1916 he inducted Wade W Oliver (Huffman's successor in the Long Island college) into the ways of microörganismal life; and in 1917 placed D M Ervin's name on the printed page. Wherry's reputation was such that, in 1920, C T Butterfield (U S P H S) was assigned to Cincinnati for collaboration. Others who at one time or another in the twenty-seven years of his residence in Cincinnati, dipped into Wherry's laboratory to get the shove that oriented them for life, make too long a list to cite.

The close of the war returned George E Rockwell to his tribe (to enlarge upon Wherry's studies on the gaseous requirements of bacterial life, to write a common sense book on *Streptococcic blood-stream infections,* to be of the first to advise the oral administration of vaccine). C F McKhann came in (to join in Rockwell's studies and go pediatric) with J A Bowen (the mucous membrane of the eye can be immunized *locally* by proper vaccine against subsequent infection with a live and disease-producing diphtheria bacillus), Merlin L Cooper (the respiratory mucous membrane can be immunized ditto, against an otherwise fatal strain of the pneumococcus), John H Highberger (proper oxygen and carbon dioxide pressures are necessary for best growth of molds and yeasts, too),

 A A Draper (the aerial growth of yeasts is favored by the presence of phosphate in the nutriment) and Frank E Stevenson (the skin reacts better to a dose of tuberculin after the childhood fevers than while they are on).

At least the half of all students to come out of Cincinnati's medical school capable of any type of independent thinking or work owed this start to Wherry. They drew their stimulus from the air that enveloped his working quarters. He published relatively little in his own name. To the day of his death commentators were necessary to expand his Aristotelian paragraphs into chapters.

I WENT to Mexico in 1925, protected against typhoid by a vaccine according to Wherry. Many more organisms were thus injectable without undue systemic effects; and their immunizing properties better, because not heat-killed. Wherry wrote me (July 6, 1925):

I hope you are enjoying the *Moctezuma* [a famous brand of Mexican beer]. I tried to estimate the number of bacilli in the vaccine I gave you and got counts varying from 45 to 103 billion bugs per cc. So I think you are getting at least 9 billion bugs in each 0.2 cc. 3 or 4 doses ought to be the equivalent of the commercial stuff. Your two Cincinnatians had such severe reactions to the second dose of the commercial variety you gave them, that both had chills & went to bed—so, for the last dose, I gave them my vaccine. Inoculated the rest of my family yesterday and I myself have taken 3 shots without anything worse than local redness & tenderness.

He had been using the new vaccine not only for the protection of travellers about to invade typhoid-ridden countries but for the therapy of the disease in man as well. Since 1925 he had treated thirteen patients, succeeding in shortening by many days their four weeks of fever; and in suppressing the "relapses" so common to the disease. But there had not been enough typhoids in Ohio to make these conclusions binding—so the "biometricists" said. Would not someone step forward with a few thousand, Wherry asked, to send him to Mexico where negligible hygiene still allowed plenty of the population

to fall sick in God's own way? The daughter of Charles P Taft (Mrs William T Semple) volunteered to raise the necessary funds but only if Marie would go along to "look after him." Besides the Tafts and Semples, the two William Cooper Procters, Mary Hanna and E W Edwards subscribed—to an expedition that made for great advance in the treatment of typhoids but one which Wherry slyly rated as good deal of a junket. He had again done the typical thing, divided his gains among some members newly added to his staff—Thomas J Le Blanc (thirty-three, writer, Rockefeller health evangelist and now the associate professor of preventive medicine with Wherry), Lee Foshay (thirty-one, M D out of Pennsylvania, clinician via Hoover and Cleveland, Ohio), Robert Marrenner Thomas (twenty-three, Cincinnati medico from California to join Florence Rena Sabin later in New York)—and taken them along to Mexico. I had arrived earlier in Cuernavaca. There he wrote me when he reached the capital (July 14, 1927):

We arrived in Vera Cruz two days ago after a splendid trip. We spent Monday at Orizaba but the mountain was obscured by clouds. Just got a glimpse of its base from the train next day. We are all feeling the altitude and will have to take it easy for a few days. [In the precedent summer he had "packed" in Michigan and had stretched his heart, according to Marie.] I don't wish to boast but I have stood the change better than most of the party. Dr Bermudez of the School of hygiene has been most kind and to-day introduced us to Prof Medellin who is in charge of the public health work of the Republic. Next week we hope to get settled in one of the laboratories and on the track of some cases. We will have to work within 4 or 5 hours by train from Mexico City. The authorities do not advise trying anything farther away [revolutionary disturbances were on in the provinces].

Mañana had not died by July 31, 1927:

We have been stamping about waiting for our freight to arrive. They stuck us duty on everything including the cotton the bottles were wrapped in—84 + *pesos*! However we got the box yesterday and I will be ready for cases next week. Dr José Sozaya, a graduate of Harvard, is temporarily director of the

new Institute of hygiene here. It is a wonderful place and you must visit it. I doubt if the U S A has its equal in beauty of design and few places only can excel it in equipment. Through the help of Dr Bermudez we have met the chief *jefes* who promise all sorts of things. P W Monroe, a leading American physician and surgeon here, has been most kind; and H Mooser, the Swiss pathologist & bacteriologist at the American hospital. He has assigned to us our first two cases—cultured by himself. He is very clever and has done a lot on rat-bite fever; has many things going all the time. He's a regular Mexican, or Swiss, "Rosenow."

Time is going fast and unless we get more cases soon, the expedition will be a fizzle. We have been unable to insist upon the fulfillment of promises made to us heretofore because we did not have our materials; but in a few days we will be able to push the inspectors to report all febrile cases for culture. I brought along a tube of vaccine to immunize Foshay but used it up in treating Mooser's cases. One was a relapse, the other a German girl of 24 yrs in the second week. After 6 daily doses their temperatures came to normal. Hope this means something. Mooser says that if cases appear as in previous years he may be able to give us 50.

If I had had a little foresight I might have run down to-day to see you and returned Sunday, but I was so anxious to get the lab established and media ready that I left the hotel early this morning without thinking of the possibility. On the way home I got lost and did not get back to the hotel until late. It is *I* who will have to push things or we may not get enough cases to warrant the expenditures.

Before returning from Mexico for his work in Cincinnati, he wrote his daughter who with Marie had preceded him to U S (September 11, 1927):

I sent off a scrappy note to mother this morning—in a hurry, as I got up late. Please thank her for the check for fifty dollars. I am about out of my own money for my accounts didn't come out square last week and I had to put twenty pesos in the fund! Le Blanc & Thomas have not yet returned from Cuernavaca. I expect them this evening.

I despise the thought of not seeing you before you leave for

Smith. Perhaps I will not stay much longer but even then I will get back too late to see you before you go East. I have found no new cases and think I will be through with the three I am treating in a few days. Perhaps I could add more cases to the list by returning to Cinti. Mother writes as though there were some at home. . . . Tell her I will get the belts & purses she suggests. I am going to have a silver door-plate made for Dr Sozaya to put on the room he has set aside for us foreign workers—GUEST LABORATORY. Well, it is 3 P M & I must hurry to the bank and get this in the *Correo*.

Wherry came out of Mexico with the accounts of fifteen further instances of typhoid fever to add to his Cincinnati list, scientifically proved to be such and young enough in the run of the disease to make clear the value or valuelessness of his vaccine therapy. The whole story was published shortly [*73*]. He compared the results of treatment with his formaldehyde detoxicated vaccine in twenty-eight cases with the fate of sixty-eight "controls" treated according to Hoyle. Throughout his series:

the course of the disease had been shortened, the temperature uniformly showing a tendency to drop to normal after the seventh or eighth dose and then coming to normal by irregular lysis. The average duration of the fever in the treated cases was 27.5 days, in the controls, 39. The incidence of complications seemed decreased—seven percent in the treated, thirty-six percent in the untreated. Convalescence was shortened . . . The death rate decreased from ten percent for the untreated, to zero for the treated.

BEFORE this report, two others on practical vaccine therapy had appeared [*71, 72*]. Underlying his successes were principles.

His experimental findings and his scientific abstractions had increasingly moved the locus of immunity from a position somewhere "in the blood," to where it really belonged—the tissues themselves. Tissue immunity was the essential thing! The appearance of "immune bodies" in the blood was just the consequence of its sewering them out.

With his collaborators he had produced localized tissue immunities—in the eye, in portions of the respiratory and alimentary mucous membranes, in the skin—by topical application or local injection of his vaccines. But in these experiments, the signs were plain that from the locally immunized spots substances passed into the whole body so as to make resistance to the disease more general. He could discover immune bodies in the circulation.

At times, however, things did not go so smoothly. Just as he had seen a localized immunity develop, he now saw a localized anaphylaxis—a hypersusceptibility, as he called it. As a second dose of horse serum in diphtheria treatment had at times not benefited but killed the patient, so after his vaccine injections, Wherry had noted not "cure" but varying degrees of "reaction." These local effects of a second dose of vaccine were identical, Wherry said, with what happened when live organisms got through the body barriers and started on their way. He burlesqued the arrangements of words that men used to "explain" the situation.

"The bacteria, having gained entrance to the body through some suitable path, make their way into the blood or lymph streams or into the tissue spaces, and, if the conditions are favorable and if the resistance of the host is such or so, they grow and multiply and set up an irritation of the tissues."

Wherry continued:

I have not really quoted the above statement but believe it represents fairly the current mode of evading the plain statement that we have very hazy ideas concerning the first steps in the process of infection. . . . We should be interested first of all in how bacteria gain entrance to the tissues, for in order to do so they must penetrate into either skin or mucous membrane.

What, in more scientific phraseology, really did happen? Wherry said:

Let us focus attention on the factors which make possible the invasion of this mass of colloids . . . which we call the animal body. So far as the microörganism is concerned, in order that it may lead a parasitic existence it must be provided with a

type of respiration . . . which will enable it to survive in the relatively low tension of oxygen found in the tissues of a living host; and it must be possessed of ferments which will enable it to utilize the sources of carbon and nitrogen furnished by the host. It must find the food substances in solution (as after trauma) or be able to produce chemical changes which will bring about a solution of the tissue, for, under normal conditions the cells . . . contain little or no free water.

Emphasizing again his experiments on the inability of bacteria to grow upon media too gelatinized (since such contained no free water) while they grew luxuriantly in the "waters of syneresis," squeezed off by the media, he went to one of his great generalizations:

In quite an analogous manner the bacteria which are capable of producing an extensive local edema are the species which spread most rapidly . . . *B pestis, B anthracis, B tularense, B welchii, B œdematis maligni,* the streptococci of erysipelas, scarlet fever, epidemic sore throat, strangles in horses . . . The mechanism by which these bacteria produce the hydration of the tissues which enables them to grow and multiply is not clear.

Actually, Wherry was clearer on this subject than anyone else had been before him: "The filtrates of cultures contain substances which produce local congestion and edema . . . these might be amines."

He supported his conclusion by collection of the much scattered evidence which showed that disease-producing organisms quite regularly produce amines, and that these increase the swelling of laboratory proteins just as they increase what he had called "tissue hydration." Infestation with bacteria was thus turned to infection by them, if endowed with proper life capacities; and the harmless "saprophyte" suffered reclassification as a "pathogen."

But these bacterial soups, besides thus making for a swelling, also produced immunity. This could not be due to their content of amines, for such compounds are of too simple a chemical composition to produce it—things much more complicated, like the complete and original albuminous materials from which the amines come, were required. Wherry said:

 ". . . Because the filtrates have antigenic value also, it does not follow that the two substances are identical."

FROM his bacteriological and clinical observations Wherry built up concepts of infestation and infection, of localized and general immunity, of localized and general "anaphylactic" susceptibility, sensitivity, and the schemes for their discovery and treatment that were the enveloping spirit of his laboratory, the guide to its therapeutic ventures, and the substance of the too few "contributions" he made to the printed page. He had for years employed vaccines to bring up general immunity, thus to kill down more effectively what were the general or local manifestations of infection. Vaccine therapy by the medical world, however, was little thought of. His associate, Stanley Dorst stated the reasons therefor: the manufacture of vaccines was too much a commercialized venture; even the right-minded failed to get in culture the true cause of the disease to be treated; straight-out stupidity and incompetence lay in too many of the "technicians" so largely relied upon in hospitals for "scientific" diagnosis.

What did Wherry declare necessary? Individual study of the individual patient by the bacteriologically competent was needed if results were to be obtained. He had always insisted upon an "autogenous" vaccine (one produced from the specific microörganism infesting the patient himself). Its preparation was easy when only one organism was involved. But how might one know in infections from the nose, the lung, the gut or the genito-urinary tract—where three to fourteen invaders were discoverable—which was *the* disease-producing germ? Wherry answered: Discover to which of the several the patient is "sensitive." To this end a vaccine needed to be made from each of the organisms separately, a bit injected into the skin and the effects noted. If a welt, or an area of redness for a number of hours about the point of injection was not produced, the patient was either not "susceptible" to infection by that organism, or "immune." That organism, obviously, was not a source of his constitutional poisoning and might be set aside. But if a more positive reaction was obtained, then to relieve the general or local symptoms, "desensitization" had to

be practiced. This called for tiny doses of the vaccine prepared from all those strains to which the patient had proved sensitive; repeated day after day until "immunity" had been produced. This point was reached when increasing doses of the vaccine no longer occasioned a local reaction. The patient had then learned to meet his poison—a matter proved by the cessation of symptoms for which he had originally consulted his doctor.

A paper setting forth these ideas, after years of work, appeared in 1928 [*74*]. Here was description of his "sensitivity" test, the rules for the selection of proper "antigens," illustrative case histories of patients, particularly of those who had been the victims of "mixed" infection—sinusitis, asthma, colitis, skin eruption.

He repeated his beliefs in a chapter written for E O Jordan's *Newer knowledge of bacteriology and immunology* [*75*], entitled *Phagocytes and phagocytosis in immunity.* Preceding his views were clipped history and fine English. Recalling "the ardent contest between the champions of the humoral theory of immunity and those who maintain that certain body cells play an equally important part" he held both parties to have right on their side.

When foreign bodies of a varied nature, including parasitic microörganisms, gain entrance to the tissues, they are invested by certain cells derived from the fixed tissues or from the circulating blood. . . . When this ingestion (phagocytosis) is followed by digestion the host recovers, otherwise it succumbs. . . . Many investigators question the ability of the phagocytes to kill the parasites. Some maintain that the parasites are killed first by normal or acquired bactericidal substances and then ingested and removed as so much foreign debris.

He summarized briefly and pungently the "more important steps in the growth of our knowledge." Starting with the phagocytic half of the total problem, he reviewed what we know of the anatomy and the origin of the tissue and blood cells involved in the process. The Kupffer cells of the liver were to him "specialized endothelial cells within the capillaries anchored out into the blood stream by guy ropes of cytoplasm." Pretty morphology, which did not, however, blind

 him to their physiology! They had a "maximum power of phagocytosis and cleared the blood stream of foreign particles within a very few minutes." Wherry had great confidence in these "normal but swollen" cells, for, said he, "leucocytes are more active when they are hydrated." The white cells of the blood that carry granules which stain red with a dye called eosin (the eosinophiles) had always intrigued him. Said he:

They are called forth in response to local or general anaphylactic shock—occur in all "sensitivity" conditions, *e g* asthma, sinusitis, mucous colitis and various inflammations of the skin. The nature of the substances which call them forth is unknown but they are probably products of autolysis derived from tissues or from parasites.

The eosinophiles appear in large number in individuals infested of worms. They had long been known to appear in asthma; what interested Wherry was that they were present, too, in colitis, sinusitis, and various skin diseases. This made the latter a "kind of asthma"—meaning that the mechanism back of the symptomatology of all of them (edema, mucous secretion, involuntary muscle spasm, aggregation of eosinophiles) was probably the same. All were the product of foreign protein intoxication—sometimes gotten from unusual foods, from pollen or other "dusts"—but, in Wherry's instances from the proteins of bacteria themselves, resident within the victim. That is why he saw all of them as sensitizations, made worse by renewed intoxication or infection; why he would, by proper vaccine therapy, desensitize and so cure the victim.

He told quickly the story of a century and a quarter of such prophylactic and therapeutic immunization. Edward Jenner had started it in 1796 by "vaccinating" the human race with the "living, attenuated virus" of cowpox, to protect the race against the more virulent form of the disease, the smallpox. Louis Pasteur (some seventy-five years later) had not changed things much with his antirabic injections, for he, too, had used a living organism to produce immunity. Change came in the late eighties when the Spaniard Juan Ferran resorted to a killed culture of cholera to protect against infection with the living organism. Waldemar Mordecai Wolff Haffkine (* 1860, Russia) continued these "vaccinations"; adding to

the scheme, plague. In 1900 Sir Almroth Edward Wright (* 1861, England) had extended the list of diseases thus protected against, by adding typhoid fever. But he did more. Accepting Metchnikoff's theory of immunity (phagocytosis is its measure), he showed how such might be favored through the "opsonins;" and yet more important, how by use of the vaccines previously employed only for the prevention of disease, these might be employed to aid the patient in recovery after the disease had started. Wherry quoted Wright: "The idea that the uninfected and still inactive regions of the body can, by applying the stimulus of a vaccine, be made to bring succour to the infected regions was the mother-idea of vaccine therapy."

Wherry believed that the logical outgrowth of Wright's studies should lead to the fulfillment of a prophecy: *The physician of the future will be an immunizator,* explaining why this fair end had not yet come about. "Baffled by the difficulties and uncertainties of the opsonic technique and perhaps justly fearing the dreaded 'negative phase' the physician still fixes his eye on the chemical and physical manifestations of disease and largely ignores the parasites whose destruction is the *sine qua non* to recovery." It made him suggest:

In view of the specificity of antibodies, therapeutic immunization must develop along specific lines. . . . We must do more than merely inject an antigen. It must be the right antigen administered in the proper dose at sufficiently frequent intervals.

But how to find it? "When a series of heat-killed bacterial antigens is injected, some give rise to local urticaria. Its production indicates susceptibility." This local edema Wherry saw as a reaction fatal to the interests of the patient and favorable to the further life of the invading microörganism, for it "(a) provided dissolved food for the bacteria, (b) diluted antibodies, (c) immobilized phagocytes, (d) prevented absorption of antigenic substance and (e) favored digestion of the fixed tissues and abscess formation." To combat the situation, he counselled the doctor:

Every effort should be directed toward reducing the edema

 by the use of hypertonic salines, glucose, incision, etc; and in the case of open wounds, antibacterial substances should be drawn into the focus by establishing an external flow of serum. As many of the parasites as can be reached should be killed by the use of dyes, etc. Often the successful reduction of the edema at the beginning of an acute inflammation may by itself so favor the normal defense mechanism that healing follows promptly.

THE summer vacation Wherry spent in Maine. He wrote of his activities from Lincolnville (August 25, 1928): I wish you were here to go sketching with us. Unfortunately the fogs roll in and spoil our game. Several of my daubs tickled me for a while, until it was pointed out that the perspective was conspicuous by its absence, and some other vital defects stared the ordinary beholder in the face but went right by the admiring eyes of its creator. Occasionally we see a four or five masted schooner in full sail but these will soon be gone. They burned up five of the pretty things in the Portsmouth harbor last week. Penobscot Bay used to be a great centre for salmon fishing but this industry is on its last legs for the salmon don't like the big dam built just above Bangor. Where they used to see billions of young salmon in the breeding grounds, one can scarcely find any now.—Thanks for letting me see Chandler's letter. He expresses what many of us feel. It is too bad that universities never try the graceful thing while a person like Miss McVea still lives.

The reference was to Emilie Watts McVea. Born in, and warm lover of the South, she had come from Knoxville at Charles William Dabney's bidding to the deanship for women in Cincinnati's university, to proceed after eight years of it to the presidency of Sweet Briar college for women in Virginia, until illness quenched her vital fires.

As winter came, Wherry might not see the "daubs" he had made, hung for show in Closson's gallery downtown. But he could read about them from his bed. His heart had gone weak. It was nothing, he said. He would rest now, and then ask for a long overdue sabbatical year. With this thought still fresh

in his mind, a telegram from the Rockefeller foundation suggested that he go to Manila and its School for hygiene and public health in the university of the Philippines, for two years. He was for declining, when Marie, sensing his enthusiasm for the project, suggested that he ask if one year might prove acceptable. It did; and he started from Cincinnati in the spring.

From Honolulu, from the beach at Waikiki, he sent a report of his westward journey (April 25, 1929):

We were pretty much on the go in S F having most enjoyable visits with the Strietmanns, Kellys, Ervins and Briccas. By chance we ran into Woolley [he had resigned from the Cincinnati faculty, had spent a year in Detroit, and had then gone to California with a tuberculosis of the spine] who was up for *x*-ray, looking well and as sassy and self-centred as ever. He asked for no one. Here, we have been overwhelmed with kindness—Fennels, Larsons, Leonards, Waysons, etc. I am to spend to-morrow with Wayson talking leprosy; and the day after, I talk on vaccine therapy to the medical group here. Larson said that they would be curious to know what I thought, as the "authorities" had come out attacking the usefulness of all vaccines. If I am proved wrong, I will have to devote more time to painting.—Say! I bet you went completely cuckoo when you were here. I have never wanted to be able to paint so much as now. The place is putting a spell over me.

Wayson's clinical observations on treated and untreated leprosy are most interesting. I believe he is right in his estimate of the ester work [the administration of chaulmoogra oil or its ester, at the moment hailed as "cure" for leprosy]. The problem will have to be solved all over again. I wonder if Le Blanc could compute for me, on the basis of probabilities, how many solutions there are to a problem? After that, perhaps, we might start.

HIS first letter out of the School of hygiene in Manila, had nothing to say of the town, but reported instead on the fate of another of my personal pets. My laboratory had always carried a rather extensive cross section of zoölogical life—

 salamanders, bull frogs, mud-puppies, fish and carnivorous birds—and as disease or death overtook it, medicine's best minds stood by. The doctor, consultant, diagnostician, bacteriologist, pathologist and mortician to the gang was most commonly Wherry himself. This time it was the death of a parrot (June 20, 1929):

The slides arrived and I concur with Dr Sanders's diagnosis—one showed a very good section through the body of a mite and a cross-section of two of the legs with muscle showing plainly. The bird died of a pulmonary (bronchial) infestation with a sarcoptid mite. I was sorry to hear of Ruby's death, too.

Ruby was the six-year old, $30,000 East Indian rhinoceros of Cincinnati's zoo, dead of beri-beri. The animal had gone paralytic some months earlier and Doctor Dock (Norton, DVM, 2824 Vine street) long-time veterinarian to the park, had asked me in. We had become colleagues in earlier days in consultation over birds, when he had left this matter much in my hands by saying: "You know my specialty is lions and tigers." Wherry was a bit cruel in further comment: "It would have been a great triumph if you had pulled her through. I hope for your sake that the elephant does not sicken next."

July 25, 1929, he wrote again:

It takes time to get things going satisfactorily in new surroundings but at last I am ready. I had hoped to get right at treating more typhoids but owing to lack of interest on the part of the assistant prof of medicine who handles the typhoid pavilion, we have been delayed; now we have permission and may get a series.—Manila is full of typhoid. Bacterial dysentery ran high and at present we have quite a little dengue. I cannot see much improvement in general health conditions. They have spent $2,500,000 annually; but this was largely consumed in organization & personnel and is scattered over the usual public health activities which we have taught to be essential. Soil pollution is widespread in Manila itself, yet nothing constructive is being done to meet that situation.

September 14, 1929, he reported to his assistant in bacteriology [the modest Craig Howard, of the best of his departmental teachers]:

. . . We are enjoying the life in Manila very much and I will have to drag my family home. They wish that we were to be here for two years instead of one. We get out week-ends for sketching when the weather permits. I cannot see that I have improved much. The wet season was quite wet. Two weeks ago the centre of a typhoon came up to within thirty miles of the city & then, fortunately, swerved north. Typhoon signals jumped from 4 to 7 in a few hours and everyone ran home to make things fast. The floods put our water supply out of commission breaking the main thirty feet under the Mariquina river. They got a temporary supply of raw water installed & now the city has heavily chlorinated but still much polluted & muddy water. The local health office has gone in extensively in vaccinating the city population against typhoid, dysentery & cholera. They use a serum-sensitized vaccine. One cannot rely on their statistics however, for they are handicapped by inefficiency. This school of hygiene is their hope. . . . I have become interested in isolating acid-fasts from nature. Next week I try cultures from leprosy.

I had a nice letter from Rockwell and I can see that you have done things to improve the department and I am grateful to you for it. While I am enjoying this, I am already anxious to get back to my old friends.

Two weeks later he wrote me (September 28, 1929):

I felt encouraged last week-end over a picture I got at Novaleches, of mountains, lake, and plumed grass.—Margaret got a bad throat & has been laid low for ten days. She developed a curious membrane and while I could not find diphtheria bacilli, I got worried when it did not yield to gentian violet or acriflavin. I called in Dr Watrous. He said he had not seen a throat like it before, but tried 5% silver nitrate & it cleared right away. It pays to call the doctor early!

We have enjoyed the company of young Dr Ralph Wheeler —son of the ant man of the Bussey institute. Ralph was a member of the Roosevelt expedition to Indo-China & came here to get treatment for malaria. He has been collecting the swifts of the P I. He doesn't care to practice and is undecided about the future but thinks he will go in for some branch of public health where his zoölogical instincts will have a chance.

 The members of that expedition certainly had a hard time with disease although it was successful otherwise. The trouble with being a physician to an expedition is that you have to deal with a lot of egoists who won't take advice. I am not sure that that was the reason for the illness in the Roosevelt expedition but that is my idea.

I have started culturing the leprosy bacillus but so far with negative results.—Please give my best to the Black faculty.

HE wrote again to Craig Howard on October 26, 1929:

. . . Let me tell you now that between your efforts and Dr Strietmann's I was treated like royalty on the *Dollar* line. I liked eating with the captain on each boat, too, but several times I had to dress for it and that bored me.—I wish I could get a record of the marvelously lighted scenes we are surrounded by all the time; but I am too bum an artist. However, if I ever do learn to paint I am coming back to the tropics.

I certainly miss the laboratory. The reason I am writing you so long a letter is that I am sort of wound up—it is just after my maiden lecture and quiz to 12 students taking bacteriology in the course on *Public health education.* They are to teach public health in the schools. It will be interesting, in a way, to see what we can make of them—perhaps just what we make of our own students.

A couple of months ago we gave the *Moss aptitude tests for medical schools* to the sophomore medical class. The results show that the students here are just as capable as those in the medical schools of the U S A. That is interesting if true—for the grades made in the aptitude tests corresponded exactly with the grades made by the same class in biochemistry. I believe that any old sort of test will throw the students into three classes.

A letter to me was dated November 22, 1929:

We returned last Sunday from Baguio. Unfortunately the Igorrotes are not allowed to come to town in their pristine glory but must wear shirts. This requirement was instituted of the missionaries, who thereby think themselves exerting a

civilizing influence. The Igorrotes work hard; their women along with them and enjoying equal rights. They are stocky with long bodies and rather short, powerful legs, Mongoloid features and absolutely reliable characters. Captain Gardiner's wife got some of the soldiers to pose in costume and Marie and Margaret caught some interesting studies. I stuck to the scenery and the pine trees.

I have been trying various stunts on the lepra bacillus and recently obtained cultures that show proliferation. I would like to get more "real" cultures, for I believe it would make possible treatment of the disease by desensitization. It is surprising how often the recurrent attacks of leprosy are markedly urticarial and anaphylactic in type. Dr Schöbel here has gotten suggestive "takes" in monkeys by *super infection, i e* reinoculation, after *sensitization.* His work on syphilis and yaws in monkeys fits in nicely with what I have been preaching about the rôle of sensitization in infection and desensitization with recovery—monkeys are sensitive to reinoculation with yaws until they have run the course of the disease, when they become desensitized; and the whole course from sensitivity to desensitization can be shortened by using repeated doses of a killed virus. The question of the complete cure of syphilis and its prevention by inoculation is wound up in the preparation of a suitable antigen which will give the desired desensitization. I am to talk on this subject to the Army med officers club next Wednesday. I find Major Simmons, who heads the Army medical research board, good company; and Dr Schöbel drops in quite frequently. There are few here who know what he is talking about.

In the new year he wrote again (February 7, 1930):

Last week I sent you a set of poker chips by registered mail. I had intended to send you the receipt in this letter but cannot find it. I hope they reach you.

I have just written a preliminary note for Dr Hektoen on the cultivation of an acid-fast from leprosy. I have gotten it proliferating in one medium only, have grown it from three cases and have two subcultures. It grows very slowly; and so far only within the semisolid medium at partial oxygen tension and with increased carbon dioxide. Like the lepra bacillus in

smears from cases, it cannot be stained by the T B method if it has first been treated with xylol & alcohol.—We are busy getting set to leave Feb 26th, hoping to spend 3 weeks in Kashmir. They say that the Kashmiri women are the most beautiful in Asia.

Official account of this growth of Hansen's bacillus (long seen in the lesions of leprosy but never before obtained as culture upon artificial media) appeared in Hektoen's journal. Less than four pages told the story [*77*], with the half of these taken up by photomicrographs. He repeated it, somewhat later, with a bit of poetry added [*78*]. Success had come to him by preparing a proper ground for the organism and enveloping it in a proper atmosphere. So he had beaten up hen's egg (both white and yolk) with oleic acid and glycerine and half stiffened the mixture with a bit of agar. He had then arranged this semisolid mass in such fashion that he could vary the amount of oxygen and carbon dioxide contained in the atmosphere above it. The methods employed were those which he had earlier found optimal for the growth of other "acid-fasts." Taking a bit of the blood oozing from the freshly "snipped" surface of an actively growing leprous lesion—he had made sure that it really contained the causative organism by direct microscopic examination—he spread it upon the semisolid medium. In four to six weeks, growth appeared in samples from three different patients; and from these primary growths he succeeded in subculturing the organism. But this was ticklish business, for the organism refused to develop unless fed this special medium and only when air-conditioned as already described. Even so, after more weeks, though it did not die, it refused to grow further. "Best growth," was assured "in cultures kept first at partial oxygen tension (little O_2 but CO_2 present) for a month, after which they were kept under O_2 and CO_2."

WHERRY'S son William arrived in Manila in time to complete the family fold before its departure for India. A first stopping place was Agra—which thus saw again its once boyish visitor as a somewhat tired man. "It is getting very hot here," he wrote (March 21, 1930); "and we will be

glad when our *tour* is over." In the next month he had reached the land of his search, to write from Houseboat 817, Nasim Bagh, Srinagar (April 27, 1930):

I was glad to hear from you. . . . As to the college of medicine, your comments on the new system prove again that we two think alike. My question is—*Reorganize? Reorganize what?* Instead of meeting some of the real needs of our university—like better men at better salaries in the liberal arts and engineering schools, full-time men in obstetrics, gynecology & skin & venereal in our own school—I bet you that the whole show will end in a rewriting of the catalogue. And when the catalogue is rewritten, the same old boys will be teaching the same old subjects in the same old way. And why? Because they are the same old boys with the same old ideas. No, I don't think I shall come back feeling that the university has made any progress. But why should I bother about the marionettes on the other side of the world when the beautiful vale of Kashmir urges me to produce horrible reproductions of her snow-clad mountains encircling her floating gardens—islands covered with huge chenar and poplar trees, gardens full of blooming apples, pears & pomegranates, and wide stretches of yellow mustard fields? This has been a cold spring. Even so, the plant life is very beautiful. I shall be sorry when we leave.

Our houseboat is quite comfortable. There are six of us [Frank McCuskey and sister Lillian had joined the group], fed & taken care of by a crew which lives on an accompanying houseboat. We have a large living room, a dining room, a pantry & three bed rooms, each with its bath. We eat kicheri, pilau, curry & rice, soup, lamb, mutton & vegetables & much tea & many muffins. We have *chota hazri* at 7:30, breakfast at 11, tea at 4:30 & dinner at 8. The boat is provided with a *shikara,* a flat bottomed canoe some 20 feet long & 3 feet wide, upon which a canopy is erected; when cushioned & paddled by 4 men it makes a convenient and comfortable way of getting to neighboring points of interest. If we want to go on a long trip we hire a larger *shikara* for 8 annas [16 cents] an hour.

Nasim Bagh, or Nasim gardens, is on the shore of Dal lake. Here we have a wonderful grove of chenar (plane) trees—

hundreds of them 6–10 ft in diameter—one of the Rajah's fruit & flower gardens and a mosque, famous because it owns one of the hairs from Mohammed's beard. It is called *Hazarat Bal* & every Friday, thousands of Mohammedans come from all over in canoes to pray. There has been heavy rain for two days & last night much new snow fell on the nearby hills. So to-day I am reading Edgar Wallace, Oppenheim & such trash.—We came up from Peshawar over a bad mountain road. As it was so badly damaged by landslides that it had to be closed, we will go back another way, by Jammu, on the 10th.

Apr 29th—Yesterday & to-day have been gloriously beautiful and we have spent the days painting on the lake and at Shalimar gardens. One reaches Shalimar Bagh by a long canal bordered by willows & chenar trees. These gardens were made —as most of the great works of art in northern India—by Akbar the Great Mogul emperor. Laid out for his favorite wife, one beautiful garden rises above another in four tiers to the foot of a range of beautiful hills. Above everything towers the blue & purple mass of snow-capped Hazribal, 13,000 feet high. A twenty foot stream flows down the centre of the garden through white marble channels & black marble rest houses, forming a series of falls, and in the topmost garden operating hundreds of fountains. The floors of the gardens are a vivid green dashed with wide splashes of white and purple daisies, pansies, iris, cedar, poplar, pine, chenar & lilac in bloom. Unfortunately the Kashmiris are a dirty lot who never wash their clothes—so they are not as decorative as they might be. One misses here the bright colors in the clothing of the plains peoples.

I am sorry to hear that the papers and Sherrill [Cincinnati's city manager] are riding Bachmeyer. I doubt if they could find a better man. I hope Sherrill doesn't want a job for one of his army friends. That would be fatal.

MAY 31, 1930 he was in Cairo "so missing letters." Its museum had "enthralled" him. Whereafter he went to Tripoli, the Holy Land, Greece, Italy and Germany. Early in July he landed in Switzerland—with appendicitis. In the

Bezirksspital of Interlaken, surgeons de Cervin and Rieben operated upon him, with E C Rosenow, who had driven over the mountains all day from his vacation resort, standing by. It was the second time that the two now famous classmates out of Rush had thus met in medical crisis. In three days he was convalescent—with windows open and the birds flying upon his bed for crumbs. Then he made his way to London to report (August 31, 1930):

I had a very comfortable two weeks in the little county hospital at Interlaken, and amused myself with water colors of the scenery and colored reconstructions of some sketches I made in the Berlin zoo. I am glad to hear that Weis is coming over. Wish I could go through a gallery or two with him (might learn something you know)! We have seen the National & Tate collections and must say that I am very fond of the British work, especially the portraits by Sargent [American, but labelled "British school" over there] & Augustus John. The latter is Britain's leading man. You see, I talk as if I knew!

I will have many of Eckstein's stories to read when I get back; also your *Permanent Palette* in its completed form—although, you will remember, I read the first draft. I told Brentanos in Paris about it and they are sending for copies. Thought I might as well help you sell a few!

Before Mrs McCammon [his technical assistant] went on her vacation, she wrote me that she had been unable to get the hospital to clean my laboratory. So I suppose that is the first job I will have to tackle. The filth of my department of bacteriology and hygiene is a disgrace.

I have done little medical visiting—the Koch institute in Berlin, the School of trop medicine in Hamburg & the Pasteur institute in Paris only; but I am glad to have seen these. They emphasize what I have always said—there is only one thing that counts, brains. The places where Koch, Metchnikoff & Pasteur worked are not any better (if cleaner) than my own laboratory. Plotz has installed for himself a white tiled room in the Pasteur institute "at his own expense." Most of its men were away on vacation but a Dr Rabaud (who founded the Pasteur inst in N Y city) spent an hour on me. He was rather

 interested in a streptococcus which he had isolated by Rosenow's method from the root of a tooth extracted from a dementia præcox case. The first subcultures when injected into rabbits produced death with marked congestion of the cerebral cortex; subcultures failed to kill or produce such lesions. He thought he was getting improvement with a vaccine. Rabaud believes that there is a disturbance of internal secretion in these cases and in one or two has noted improvement after implanting testicular and thyroid grafts from monkeys. Recent work by someone has shown that monkey's blood falls into three groups—two common & one uncommon —and he thought that the failure of grafts might be due to using tissues from monkeys of the wrong blood group. At any rate he is going to make his next grafts from a monkey with homologous blood grouping. Rabaud struck me as an up-to-date clinical practitioner and investigator. By the way, he says that the only intestinal antiseptic is argyrol by mouth, liquid, or in keratin coated capsules—"harmless in any amount." I'll give you another clinical tip which may help you. I got a bad attack of eczema before leaving Manila and could not get rid of it until I got hold of some "bile salts." The attack was accompanied by liver disturbance characterized by incomplete digestion of fats—just as in the cases Tashiro & I treated at home. This is the only time that anything I have discovered has benefited me.

What Wherry here referred to was the outgrowth of his knowledge of the effects of intestinal putrefaction; and Shiro Tashiro's, of the antifermentative activities of the bile salts. The two believed certain eczemas to be the peripheral manifestations of a lowered liver function, failing at times to "detoxicate" poisons produced in the gut. Wherry had always wished that his name might be joined with Tashiro's on a paper. He got his wish [*79*].

The years-old eczema of a medical student who showed too few bile salts and too many fatty acid crystals in his stools had been taken as indication of a liver inadequacy. Bile salts by mouth, up to a grain three times daily, were given. The boy was cured in a week, to convert himself into a guinea pig for the benefit of medical congresses. Presenting himself as a

clinical subject at their opening, he would reëxhibit himself at their close as cured—having taken bile salts in the interim. Wherry and Tashiro detailed the histories of five such cases with "others" announced for subsequent report.

More therapeutic instruction followed:

I forgot to mention this yesterday—if the pyelitis in your patient is due to *B coli* or a related organism, try my method of treatment. You know that I found out in test tube experiments that whereas *B coli* is quite resistant to acriflavin alone or hexylresorcinal alone, it is killed in high dilution of their mixture—or when weakened by one is killed by the other—same principle as a heart blow followed immediately by an upper cut. On this basis I cured a child on the pediatric service that had had *coli* pyelitis for months & been on hexylresorcinal without benefit. Later I cleared up two cases of *coli* cystitis; I gave one grain of acriflavin (keratin coated pills or capsules) every four hours for 2–3 days until the urine was strongly fluorescent; and then started (continuing the acriflavin) with 5 grains of hexylresorcinal every four hours for a day or two. In one of the latter, the patient felt badly after 24–36 hours of the combined therapy and treatment was stopped; nevertheless on the next day the urine had cleared! Adios!

Though separated from his appendix, Wherry maintained that the operation had been unnecessary. He was "sensitive," he said, to some of his intestinal flora and had suffered an "asthmatic" cramp of the involuntary muscles of his lower bowel. He convinced even E C Rosenow that he would have gotten well anyway if only they had given him sugar. The latter wrote to Marie (August 2, 1930): "Tell Will that Dr W J Mayo has stated that in obscure abdominal conditions resembling appendicitis, the cause may be an intestinal allergy, quite as he surmised." Rosenow continued this letter in more personal fashion, making some notes that one day may be of medico-historic interest:

. . . Just received a letter from Dr Plotz at the Pasteur institute telling me of the isolation in pure culture of a diplostreptococcus corresponding to the one I have repeatedly isolated from the spinal fluid in cases of poliomyelitis. I think I told Dr Wherry of seeing a case of polio at the congress in

Paris. I made a spinal puncture and took part of the fluid to Dr Plotz at the Pasteur institute. He cultured it by a special anaerobic method which he has devised and obtained the result mentioned. He stated frankly that while surprised over his *unexpected* result, he was pleased nevertheless. I spent most of the afternoon searching for diplococci in the sediment. Their Gram stains at the hospital and at the institute, too, were so rotten that I could scarcely use them; but at that, I found several diplococci. Dr Plotz is going to Strasbourg to obtain more material, where there is an epidemic of poliomyelitis. I predict complete corroboration of my work for he is genuinely interested and will give my methods a fair trial. This has not been the case heretofore, especially in the hands of the workers from the Rockefeller institute. They say that "every dog has his day." Maybe Thursday July 24, 1930, the day I was willing to see the case of poliomyelitis, will prove *my day*. We will see. Good luck, with all my heart.

Marie had forwarded this letter to me with a note (August 4, 1930):

Will thought you might be interested. Plotz is from the enemy's camp, and that is a great deal. Stitches out to-day—everything fine.

XIII

FRIENDS and requests awaited Wherry when he reappeared in town. Things in the Institute for medical research of Christ hospital needed ordering. Back in 1927, its persistently generous supporter, James Norris Gamble (*1836, son of the Gamble of Procter & Gamble "mfrs of soaps, candles and oils," bachelor out of Kenyon college at 18, and master therefrom at 21, chemist, mayor once of Cincinnati's Westwood, since the age of 26 a member of his company and for forty years its vice president, †1932) had "created for, and endowed in the hospital an institute for medical research." He wished it operated as were similar institutions elsewhere in U S A; and to make the plan practicable, pushed a million and a half across the table to the hospital's trustees. In charge of this brilliant idea was his son-in-law, Alfred K Nippert (U C graduate, attorney, ex-judge, husband of Maud Gamble); while first to be drawn upon for counsel had been Wherry. The two were clear-headed as to what needed to be done—a floor of the newly-building hospital was set aside for the purposes of the new enterprise and men to staff it were looked for. Wherry should have been placed in direct command as obviously best gardener of the scientific upshoot. He demurred; and no proper pressure was put upon him. He had nominated for the place Herman Mooser (Swiss out of Mexico, authority on typhus and rat-bite fever; sponsor for the idea that chronic immunity is the product of chronic infection). None better could have been chosen as productive worker; but scientific philosophy and foreign manner did not go so well in a place not free of all sectarianism, and American primarily in its regard for the sick. So, before long, Mooser was to return to his Mexico, and Christ hospital's grand project was to shrink again to the safer routines of urinalyses and negative August von Wassermann reactions. Even so, the lungs of the new baby had breathed a little—Mooser had enlarged his studies on the carriage and harboring of typhus

fever; Lee Foshay had developed new cultural and staining methods for *B tularense;* some of the other men had proved real chemistry to be hidden in the biological.

September 24, 1930, William H Howell (seventy, head of U S's thought in physiology for forty years, author of the country's standard text upon the subject, and now the gentlemanly director of Hopkins's school of hygiene) wrote: " . . . delighted to know that you are willing to give one of our De Lamar lectures. Will you please send me at least a provisional title?" Wherry announced: *Hypersensitivity to bacterial proteins and its rôle in susceptibility and immunity;* with the date set for March 31, 1931. It was printed [*80*], to represent, perhaps, the most succinct statement of his scientific philosophy ever made—or that succeeding years were to permit him to make. Essentially technical, some of the following items were more general in their interest.

He reaffirmed his notions of the difference between infestation by a potential parasite and infection. To pass from the first to the second required a breaking down of the natural defenses of the body. He restated what were the biological characteristics of the microörganism necessary to such end, illustrating the play involved by detailing his experience in treating inflammation of the eye. "Bacteria localize in the conjunctiva . . . Several times I have treated a beginning pneumococcus infection with a few drops of 1–4000 optochin; the bacteria are killed quickly and healing occurs." But "such good results cannot be obtained if one waits a little longer. . . ." Then the infesting parasite becomes infectious and establishes itself within the tissues. "If the resultant edema be great, further invasion is favored and conversely, if it be reduced by agents which dehydrate colloids the progress of the infection is restrained and the infecting agent overcome by the host."

What could be done to aid the host? It had to be "desensitized"; and this through use of a properly injected, properly prepared vaccine.

All the toxines of bacteria, as well as similar poisons produced by reptiles and insects, are of such a nature that when injected they give rise to the production of antagonistic substances.

We may call the substance injected the antigen and the resulting antagonistic substance the antibody. . . . If the bacterial body used as antigen first be digested . . . the antigenic properties are lost.

How by avoidance of digestion to retain a maximum of antigenic properties while reducing to a minimum the toxic properties of his vaccines had long been his goal. Wherefore he had shifted from use of the older heat-killed varieties to his newer, made by treatment with formaldehyde, hydrogen peroxide, nitrous acid, and like substances. Thus he "detoxicated" his "antigens" even as he made them stronger in the business of producing immunity. The result was that he could inject greater quantities to get, in consequence, greater antitoxic reaction by the patient or animal treated. The injectable dose in the instance of *tularense* infection was by this method pushed to eight times the old level by his coworker Foshay; Rockwell did the same with streptococci; and O'Neil, with some half dozen strains of undulant fever. Rabbits, goats and horses were thus not only more quickly and more effectively immunized, but made into the taps for antitoxic serums of higher curative value in specific diseases than ever before known. As will appear, two great ends had been accomplished —better vaccines for the better production of "active" immunity; and better sources of antitoxine for immediate salvation through "passive" immunity.

Together with these stellar performances of fact, Wherry asked questions. He had always been at what was behind the eternal fight of one life against another. Himself, he held to the view "that in response to the entrance of a foreign protein, the animal body elaborates a specific ferment, capable of digesting it." The ferment was universally present—in the blood, in the tissues themselves. "When the protein enters a second time, this specific ferment attacks it with avidity and during the process of digestion toxic substances are produced, and if enough protein is present, enough toxic substance may be liberated to injure the animal." The injury might be general and the animal die of general anaphylactic shock; or more local, in which case more spotty evidences of anaphylaxis appeared—the patient instead of dying got hives, or hay fever,

 a colic, or a localized blossoming-out in areas once affected by the proteins of bacteria sown into that spot. Wherry continued:

> According to this theory a sensitized animal differs from a normal one only in possessing a mechanism which can more rapidly destroy the foreign protein. The defensive mechanism is not without its disadvantages. . . . When this reaction occurs at the site where bacteria are growing it is advantageous to the parasite, for the local edema furnishes food in solution, dilutes important antibodies, etc. . . . Animals which have recovered from a severe general anaphylactic shock are resistant to another dose of the foreign protein for a considerable time and are said to be desensitized.

Wherry utilized the fact that in many instances "the host becomes hypersensitive to a second parenteral introduction of the poisonous products of the causative agent," to devise a "sensitivity test." Heat-killed bacteria were injected into the skin. If the patient was "sensitive," the spot of injection reddened and swelled up; otherwise nothing happened. Wherry reported how by it he distinguished in a "mixed" flora the particular strain or strains responsible for the constitutional symptoms of the particular patient.

These ill were of the number that make up the heartbreaks of medical practice—"urticaria, angioneurotic edema, spastic and mucous colitis, so-called chronic appendicitis, certain types of chronic arthritis." He could have added others with which he had had long experience—asthma, sinusitis, recurrent colds, and certain infections of the eye, skin or subcutaneous tissues. What he said of the matter was that "search for etiologic agents by the use of intradermal tests" had yielded him "suggestive information." Specifically, he had corralled two or three microörganisms out of a farm yard of ten or twelve species, settled upon them as the criminal offenders, had seen to their proper growth upon artificial media, converted them into vaccine, and by injection thereof gradually "desensitized" the patient; and so cured him. He allowed successes of this kind to speak for themselves. More typical of him were such words:

> Occasionally the intradermal test elicits so marked a local reac-

tion that one feels that he has found the right antigen. An additional test remains: the result of desensitization. When recovery accompanies desensitization, one feels that a causal relationship has been established.

THE summer of 1931 took him to Maine. Here he painted; and developed great enthusiasm for Jonas Lie on the island of Mount Desert. But physically he was not well. He reached home in time for the school opening. Coming to its first faculty meeting, he was seized with great pain, turned blue and slumped over in his chair. Three months in hospital followed and another three in his home; then the gingerly attempt to sit through an hour or two each day in his laboratory. From here he might direct his scientific colleagues, read of the sense of fright his acute illness had given his friends, page over the letters that brought him judgment of his medical achievements. Topley of the London school of hygiene, Pincoffs of the University of Maryland hospital, Worden out of Ravenna in Ohio, wrote in. Conscience overwhelmed his erstwhile student, Binzi Suyenaga, now in Nagasaki (March 9, 1932):

Lately the memory that you wrote me once to send a leaf of my photograph occasionally comes up to me, and I am taking this opportunity to be in accord with your old requirement.

The president of the American college of physicians invited him to address his thousand in Montreal in the week of February 6, 1933. Francis M Pottenger, graduate of Cincinnati's school of medicine, believed Wherry's "work on bacterial allergy of tremendous importance to medicine." He answered (June 13, 1932):

I accept with pleasure. I presume it would be well to choose a general title: *The rôle of desensitization in recovery from bacterial infections.*—I have been laid off since last October with angina pectoris but am about over it. We have gone ahead trying to carry the desensitization work to its logical conclusion—the production of desensitizing antisera. Dr Lee Foshay's antitularensic serum works like a charm—producing desensitization & recovery in a few days in cases that would

 require three months of desensitization by direct inoculation of detoxified vaccine. We are immunizing goats against six other bacteria and if I can afford it, we will start two or three horses this summer.

Pottenger added to his enthusiastic acknowledgment: "You are too good a man to be laid up by any infirmity." Unable because of his physical state to go on vacation this summer, he was informed (July 20, 1932):

As per the minutes of Council of the City of Cincinnati, Volume 55, page 206, July 9, 1932: Mayor Wilson announced the reappointment of Dr William B Wherry as a member of the Board of Health for a term beginning August 2, 1932, and ending August 1, 1942. Confirmed by the following vote. Yeas—Messrs Druffel, Hall, Imbus, Patterson, Pollak, Rose, Wilson, Woeste, Yeatman.

That meant that confirmation was unanimous. Other docs by other city councils had been thus complimented. But in Wherry's instance, a bit more was involved. Cincinnati's "small" council had done it—one intelligent, one free from party prejudice—one that had brought to a half million urbanites the designation, "best governed city in U S A."

He wrote me August 2, 1932:

I have had no attacks for three months and my tendency to a disturbed splanchnic circulation has disappeared. Have gone sketching several times as far as Moscow [Ohio] and Brookville [Indiana] without getting exhausted. So much for the case report.—It must be lovely in Florence. One gets dulled to the beauty of our hills, and yet after one has been indoors for several months he again sees the local loveliness. Bachmeyer fixed up the stable behind the hospital garage for me and I got two of the city work horses for $60 apiece, and expect them daily. We will immunize one with *B tularense* and the other with polyvalent strep. I hope by next winter to discover whether or not our method yields desensitizing sera. If not, we will try other schemes, for I am sure that such sera can be produced for a variety of bacteria and that they will prove curative as has our antitularensic serum.

By the summer's end he ventured to visit his former chief, Edwin Oakes Jordan, in Homewood, Illinois. Hektoen, ap-

prised of the sojourn wrote (September 22, 1932): "Somehow, I had not heard of your illness. Dear Wherry, I hope you are better and that things are going well with you." He answered (September 26, 1932):

I should certainly have looked you up had I been able to make the trip into Chicago. I think I am through with my angina . . . and am back on the job. I do hope that the position of the Memorial institute has improved, for the splendid record it has made must not be interrupted. Dr Jordan told me in confidence about it.

He was able to make the Montreal meeting of the American college of physicians in February of 1933. A (four page!) printed report [*81*] told his tale.

An important factor in susceptibility and immunity and one largely overlooked is that it is requisite, in order for bacteria to thrive and multiply, to have food in solution. . . . A microörganism can lead a parasitic existence only when food substances are provided by a host; thrives at low oxygen tension; puts the gels of the host in solution. If after implanting itself in the tissues of a host, the interaction between the parasite and the host leads to the liberation of substances which injure the host and interfere with the normal defense mechanism of the host then the parasite is a pathogenic parasite. In the sensitized animal the ability to split a specific protein is greatly enhanced and the phenomena of ordinary inflammation are greatly exaggerated. . . . The reaction between parasite and host leads to marked local edema.

The thing at stake, in his mind, was how most effectively to "desensitize" the patient. It might be accomplished "actively" by the use of small doses, frequently repeated, of a specific antigen—a proper vaccine; or "passively," through employment of a correct antiserum. "For the treatment of acute bacterial infections accompanied by hypersensitivity our hope must lie in the production of desensitizing antisera," Wherry wrote.

In the rest of his report he detailed the good results he had had by the last named methods in killing down the hang-over signs and symptoms "due to persistent hypersensitivity" in a whole flock of infections. But he did not reserve this glory to

 himself. There were Rockwell, Dorst, Foshay and O'Neil, he said, just to mention his majors. Of them he reported: "One accomplishes here in a few days by *passive desensitization* that which can be brought about only by several months of active immunization." He ended as he always did when sitting as judge upon his own accomplishments:

The hypothesis I presented, when carried to its logical conclusion is not clear in all its details but it has directed our experimental work and has brought forth results.

In March Wherry went to Seattle with Marie and Margaret to see her off to Yokohama, to marry James Gordon Ziegler (chief in the offices of the American express company at Yokohama). Three months later the senior pair used the summer months to visit the juniors there. As to interest in medicine, he had little. Upon return to Cincinnati he congratulated the third of his masters, Theobald Smith (now seventy-four) upon the receipt of another long overdue medal. A beautifully handwritten answer out of Princeton, N J, said (December 19, 1933):

I was much pleased to hear from you. It is now a quarter century since we parted on the grounds of the Anaconda company. I travel little as it does not agree with me, hence my anticipations of reaching Cincinnati someday have not come true. Science is moving so fast in many directions both + and – that I feel lost, and wonder why medals should come this way at this stage.—I trust that you are feeling well enough to take care of yourself and that your work is still not a burden.

No doubt because he was aging (sixty-eight), Jordan was about to be presented with the inevitable portrait. Wherry was too ill to respond at once to the invitation to subscribe. These words appeared upon his envelope: "1/29/34 wrote that I would send a check in a few days—2/2/34 sent check."

Commendation of his work increased. Albert P Krueger (first to prepare vaccine by grinding the organisms to death) thought Wherry's "thesis to have many points of application and to explain many clinical phenomena." Roger S Greene (director of Peiping Union medical college) was bringing his writings "to the special attention of his departments of medi-

cine and bacteriology." His former student, Alfred A Draper (director, the Steffen biological laboratories, New York) wrote:

. . . The myth has long existed that clinical laboratories *must* be commercial. I hope that you gain a bit of satisfaction from the assurance that the scientific seeds and the anti-commercial ideas which you once put into my head took root. I have studied the flora of over 3500 stool specimens. . . .

A veritable bale of letters came from patients and friends. I excerpt this sample:

You have been calling on my wife for two years. During all that time you have brought help, advice and cheer to us, the great value of which cannot be adequately appraised. We have been disappointed because whenever a plan of partially discharging our obligation to you has been broached, it has been met with refusal. Please, Doctor Wherry, regard this as a sacred pact justified on the grounds of benefit to a patient attainable in no other way.

WHERRY thought it necessary to unload. He began in the summer of 1934 with another excursion into Japan. Upon returning, he amputated the preventive medicine half of his department to make Le Blanc its head. A member for almost two decades, of Cincinnati's health board, he resigned. Its energetic and effective president (the virile son in the 90's of the medical college of Ohio and its associate professor of contagious diseases afterwards, Mifflin B Brady) answered (January 4, 1935):

At the meeting this morning attended by Doctor Muhlberg, Mr Freiberg, Mr Johnson and Doctor Brady [the entire membership] the following action was taken: You are respectfully informed that there is only one place fitting for your resignation, your own waste basket.

Now came statement from H S Cumming, Surgeon-General U S P H S, Washington (January 29, 1935):

I have recommended to the Secretary of the Treasury your appointment as a member of the National advisory health

 council for a period of five years, and he has approved this appointment.

Hektoen, Hunt, McCollum, Rosenau, Stengel, McCoy were of the crowd. It was pleasant business to be offered a horse in the wagon-train of which he had so often and so irregularly been a part; but he could not accept. Wayson wrote him from Honolulu (February 8, 1935):

I learned from Fennel [Eric A, ex-U S P H S, now practicing in Hawaii] that you developed complications which put you down again; and that Mrs Wherry suffered a fractured thigh. I write to remind you that the Waysons are hoping hard that you will both soon be well enough to be about.—I sent you recently an article on the epidemiology of leprosy in Hawaii. There are no discoveries in it, but a lot of work establishing or disrupting hypotheses. While the analysis may appear to be only arithmetical, more is involved.

He and Wherry had long discussed treatment for leprosy. Wayson continued:

I have tried to desensitize a group of patients by the use of a suspension of organisms obtained from leprous rats—killed with formaldehyde, washed, etc. A control of rat tissue alone produced no ill effects. The results, however, appear to be nil. An intracutaneous test with the same material appears to have specificity, and positive reactions occurred in 80% of 24 patients adjudged quiescent or recovering, and in 20% of 60 patients adjudged active or progressing. A large percentage of those with positive reactions developed a sterile abscess after two to eight weeks; or among those treated, after the last inoculation. A few who subsequently developed leprous reactions had acute erysipelatous inflammations develop at the site of the intradermal test, though there had been only a small (0.5 cm) indolent ulcer at the site previous to the leprous reaction.

I think I have obtained passage of the rat lepra organism through the unbroken nasal mucous membrane, with subsequent infection, in a rat.

Since 1932 I have watched the development of minor neurological findings in the children of leprous parents, and have recently seen the cases proved up with skin and bacteriologic

findings. Clinical histories had made me suspect that the disease develops thus, but I now have proof. These patients also have the organism in the nasal mucous membrane before definite skin lesions materialize. Early diagnosis will certainly have to be made in *many* cases by *neurological* examination! Here comes in the possibility of getting an intradermal test, etc!—Plague is quiet. There seems to be some "endemic" typhus. That's about all I know that might be of interest.

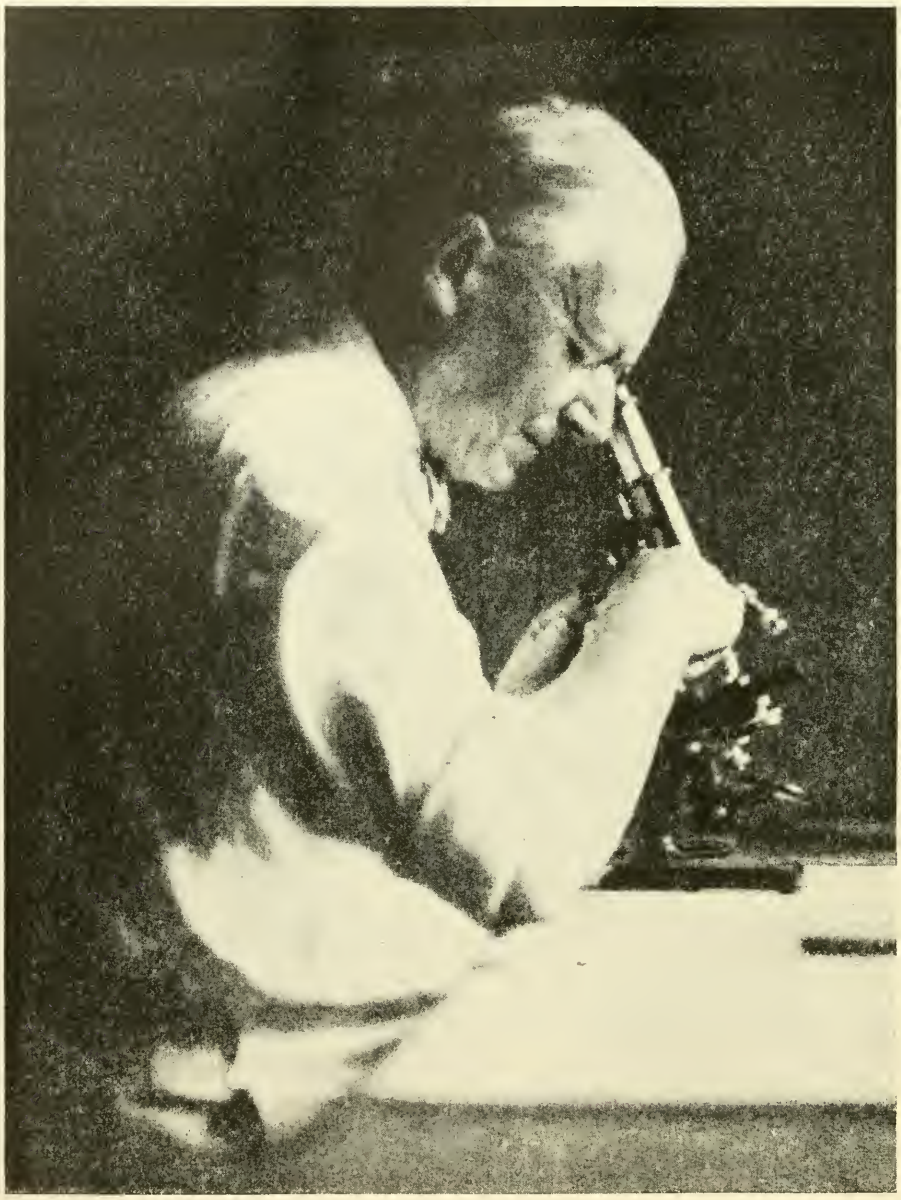
MARINE BIOLOGICAL
WOODS HOLE
LIBRARY
MASS.

Wherry now penned what was to be his last scientific paper [*82*]. It was official report on how in undulant fever—*Brucellosis*—a new antiserum, made via the vaccine injection of "6 strains" of the organism into goats, had cut in two the clinical manifestations of the affected. Human victims who had suffered for months with recurrent, invaliding and prostrating fever had been rendered "afebrile in 9 days, asymptomatic in 15, and able to resume occupation in 3½ weeks." Even better, they had remained well "4 to 29 months." Here again, and as final message, Wherry wrote: "We draw no conclusions from this limited experience."

Chronically lacking funds for his laboratory, he casually mentioned his need to Maud Nippert (daughter of James N Gamble). He wanted to enlarge his stock farm. She wrote (June 14, 1935):

Sorry to have been so short and snappy last evening—but of late, I say *no* first, and sometimes reconsider. In this case, just because it is you, I do, and so am enclosing a check [it was for a thousand] which I hope will help your pet hobby. Just what that is, I do not know—but anyway, you might as well experiment with it, as Uncle Sam.

Cross section of what was being done with such moneys is best revealed by a look at bacteriology's scientific library. In five years he and his departmental workers had brought forth more than forty communications. Besides those already named, Robert Coulter Walker had studied quantitatively the effects of dehydration of medium upon bacterial growth; Joseph T Tamura had cultivated the "virus" of lymphogranuloma inguinale (the sixth venereal disease) in visible form; Rockwell and Herman C Van Kirk had contributed to the eternal problem of the "common cold" by stressing the value of oral



FINIS, HONOLULU, 1936

administration of proper vaccines; John H Foulger had studied the "peculiar" activities of urea as an antiseptic and a bactericide; and Alexander R Johnston, the pharmacological and colloid effects of the toxic amines; Bernice Elaine Eddy had disclosed the existence of protective substances in the sputum of pneumonic patients at the time of crisis; etc; etc.

H Lara of the School of hygiene and public health in Manila now inquired if some "shells had arrived safely." They had. In one of his dreamy moments, Wherry set heart upon the half-ton bivalves indigenous to the tropics. Now, to his pride and joy, a pair reposed before the porch stairs of his Ridgeway avenue house. Lara continued (July 12, 1935):

We are very grateful for the interest that you entertain about what goes on here.—The sunset of Manila Bay, the lake and river sides, and the many lanes that once made your acquaintance are vying with each other in clothing themselves trim. They tell me that they wish to be seen by you again and that they will never get tired of posing for you and of revealing to you their hidden beauties.—Nature's truth is greater than word. I lack word. Therefore I must stop.

THE handicap of illness forced him to delegate an increasing fraction of the day's demands to his coworkers—so his junior students heard him no more in inspiring lecture; and his senior, saw him less in hours of conference. To the succession of letters that tried to make him member of, sponsor for, lecturer to, or contributor in, every type of social, health, medical and bacteriological organization or congress known to man, he had to say *no*. It was all too much—also, a bit too late. How would he spend the modicum of energy that had returned to him as spring opened in 1936? Most, he wished to see the lepers again; and a glimpse of his children would be pleasant. Why not Hawaii where Wayson had invited him? There, too, would be Badger (successor to Wayson) and Fennel and Brunot—war horses with him out of campaigns of earlier decades; and those tropic palms that hid yaws and sprue and marsh fever. So, in middle May, he went.

September 29, 1936, Wherry wrote to Tashiro from Honolulu: "I have had a wonderful summer." But the final days

had not been so wonderful. Bidding adieu to his daughter, returning to Japan, made the pain down his arm greater. And the seamen were threatening strike in San Francisco; better to hurry. He penned a last word from the *Lurline:*

We left two weeks earlier than we expected—while the leaving was possible. There is a superb oil of the original *Lurline* as two-masted schooner by Montague Dawson in the forward saloon & the reading room is flanked with pictures of clipper ships.

In San Francisco, he thought it well not to disembark. At Los Angeles (October 10, 1936) his son met him, to take him to his home for rest. Five days later Marie wrote: "Will is sitting up occasionally but feels wretched.—I try to assume your best bedside manner and to buoy his spirits. But it doesn't work very well."

HE arrived in Cincinnati on October thirty-first, 1936. It was the eve of All Saints' Day. The trip had been hard; and he was tired. His return had been unannounced. Nevertheless three of his students forced the railway gates. Gray and sweating he pressed their hands. His wife bent over him to report: "The specimens are all safe." One hundred and thirty cultures from leprosy alone were in a kit that had never been beyond the touch of his hand! He smiled. She turned to him a second time: "We are home, Will."

Bibliography

THE following list of the publications of WILLIAM B WHERRY is the only approximately complete ever prepared. It is the work of Catherine Barrère. The bracketed numbers refer to the bracketed citations in the text; the places of publication, as volume, page and year conform to international usage.

[1] *The Distribution of Segmentation and Fragmentation in the Myocardium*
Transactions of the Chicago Pathological Society *4*, 133 (1899–1901)

[2] *Carbuncle and Pyemia*
Transactions of the Chicago Pathological Society *4*, 484 (1899–1901)

[3] *A Case of So-called Malignant (Staphylococcus) Carbuncle of the Upper Lip Followed by Pyemia*
American Medicine *3*, 28 (1902)

[4] *Experiments on the Permeability of the Berkefeld Filter and the Pasteur-Chamberland Bougie to Bacteria of Small Size*
Journal of Medical Research *8*, 322 (1902)

[5] *A Case of Infectious Dermatitis in Chronic Morphinism, Accompanied by an Unknown Diplococcus, Resembling M Gonorrhea*
(With Palmer H Lyon)
American Medicine *6*, 401 (1903)

[6] *The Use of Acetozone (benzoyl-acetyl-peroxide) in the Sterilization of Water for Drinking Purposes*
Fourth Annual Report, Philippine Commission, 415 (1903)

[7] *A Report on Two Cases of a Peculiar Form of Hand Infection, Due to an Organism Resembling the Koch-Weeks Bacillus*
(With John R McDill)
Journal of Infectious Diseases *1*, 58 (1904)

Bulletin 10, Bureau of Government Laboratories, Manila (1904)

[8] *Glanders: Its Diagnosis and Prevention. Together with a Report on Two Cases of Human Glanders Occurring in Manila and Some Notes on the Bacteriology and Polymorphism of Bacterium mallei*
Bulletin 24, Bureau of Government Laboratories, Manila (1904)

[9] *Some Observations on the Biology of the Cholera Spirillum*
Bulletin 19, Bureau of Government Laboratories, Manila (1905)
Journal of Infectious Diseases *2*, 309 (1905)

[10] *Notes on a Case of Hæmatochyluria, together with some Observations on the Morphology of the Embryo Nematode, Filaria nocturna*
(With John R McDill)
Bulletin 31, Bureau of Government Laboratories, Manila (1905)
Journal of Infectious Diseases *2*, 412 (1905)

[11] *A Search Into the Nitrate and Nitrite Content of Witte's "Peptone," with Special Reference to its Influence on the Demonstration of the Indol- and Cholera-Red Reactions*
Bulletin 31, Bureau of Government Laboratories, Manila (1905)
Journal of Infectious Diseases *2*, 436 (1905)

[12] *The Bacteriological Examination of a Plague Rat, with Notes on the Capsular Substance Formed on Nutrient Agar by some Bacteria*
Journal of Infectious Diseases *2*, 577 (1905)

[13] *Tropical Splenomegaly*
(With W E Musgrave, P G Woolley)
Bulletin of the Johns Hopkins Hospital *17*, 28 (1906)

[14] *The Etiology of Pemphigus Contagiosus in the Tropics*
(With Moses T Clegg)
Journal of Infectious Diseases *3*, 165 (1906)

[15] *A Case of Amebic Dysentery, Originating in Montana: A Case of Latent Malaria*
(With J F Spelman)
Northwest Medicine 4, 277 (1906)

[16] *Insects and Infection*
California State Journal of Medicine 5, 281 (1907)

[17] *Plague Among Rats in San Francisco*
(With Agnes Walker and Edgar H Howell)
Journal of the American Medical Association 50, 1165 (1908)

[18] *The Leprosy-Like Disease Among Rats on the Pacific Coast*
Journal of the American Medical Association 50, 1903 (1908)

[19] *Fleas on Rodents and Men on the Pacific Coast*
Journal of the American Medical Association 51, 495 (1908)

[20] *The Bacteriology and Pathology of Plague (With the Demonstration of Gross and Microscopic Specimens)*
California State Journal of Medicine 6, 351 (1908)

[21] *Plague Among the Ground Squirrels of California*
Journal of Infectious Diseases 5, 485 (1908)

[22] *Further Notes on Rat Leprosy and on the Fate of Human and Rat Lepra Bacilli in Flies*
Journal of Infectious Diseases 5, 507 (1908)
Public Health Reports, United States Marine Hospital Service 23, 1481 (1908)

[23] *Streptococci Occurring as Diplococci in Rats (M norvegicus)*
Journal of Infectious Diseases 5, 515 (1908)

[24] *Experiments on the Use of Bacillus Pestis-Caviae as a Rat Virus*
Journal of Infectious Diseases 5, 519 (1908)
Preliminary note in Public Health Reports, November (1908)

[25] *The Influence of Scurvy on Hemorrhages in Plague*
Journal of Infectious Diseases *6*, 564 (1909)

[26] *I Experiments on Vaccination against Rat Leprosy II On the Extraction of Rat Lepra Bacilli from Watery Emulsions by Means of Chloroform III Rat Lepra Bacilli in the Rat Louse*
Journal of Infectious Diseases *6*, 630 (1909)

[27] *Ticks on the California Ground Squirrel*
(With F Creighton Wellman)
Entomological News *20*, 276 (1909)

[28] *Subacute Plague in Man due to Ground Squirrel Infection*
(With George W McCoy)
Journal of Infectious Diseases *6*, 670 (1909)

[29] *A Case of Apparent Cure of Filarial Hematochyluria*
(With J R McDill)
Journal of Tropical Medicine *12*, 241 (1909)

[30] *The Relation of Rat Leprosy to Human Leprosy (with an exhibit of gross and microscopic specimens)*
California State Journal of Medicine *7*, 301 (1909)

[31] *The Value of Laboratory Methods to the Medical Student*
Lancet-Clinic *103*, 575 (1910)

[32] *Some New Internal Parasites of the California Ground Squirrel (Otospermophilus beecheyi)*
(With Creighton Wellman)
Parasitology *3*, 417 (1910)

[33] *A Description of Four Filaria loa from the Same Patient*
(With O V Huffman)
Parasitology *4*, 7 (1911)

[34] *Notes on Twenty-two Spontaneous Tumors in Wild Rats (M norvegicus)*
(With Paul G Woolley)
Journal of Medical Research *25*, 205 (1911)

[35] *The Amebicidal Action of Emetin*
Journal of Infectious Diseases *10*, 162 (1912)

[36] *A Preliminary Note on Some Chemical Conditions Favoring the Production of the So-Called "Spores" in B tuberculosis*
Lancet-Clinic *109*, 134 (1913)

[37] *Some Chemical Conditions Influencing Acid-Proofness and Nonacid-Proofness in a Saprophytic Culture of B tuberculosis*
Journal of Infectious Diseases *13*, 144 (1913)

[38] *Some Chemical Conditions Favoring the Production of "Spores" in B tuberculosis*
Centralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten (1te Abt) *70*, 115 (1913)

[39] *Studies on the Biology of an Amœba of the Limax Group. Vahlkampfia sp No I*
Archiv für Protistenkunde *30*, 77 (1913)

[40] *Introduction—The Rôle of the Medical Man in the Future Control of the Tropics*
Forchheimer: Therapeusis of Internal Diseases *4*, 667, New York and London (1913)

[41] *Amebiasis*
Forchheimer: Therapeusis of Internal Diseases *4*, 703, New York and London (1913)

[42] *Diseases Due to Other Flagellata and the Ciliata. Balantidium coli*
Forchheimer: Therapeusis of Internal Diseases *4*, 760, New York and London (1913)

[43] *Filariasis*
Forchheimer: Therapeusis of Internal Diseases *4*, 786, New York and London (1913)

[44] *Plague*
Forchheimer: Therapeusis of Internal Diseases *4*, 816, New York and London (1913)

[45] *Asiatic Cholera*
Forchheimer: Therapeusis of Internal Diseases *4*, 827, New York and London (1913)

[46] *Malta Fever*
Forchheimer: Therapeusis of Internal Diseases *4*, 839, New York and London (1913)

[47] *Infection of Man with Bacterium tularense*
(With B H Lamb)
Journal of Infectious Diseases *15*, 331 (1914)

[48] *Discovery of Bacterium tularense in Wild Rabbits and the Danger of its Transfer to man. Preliminary Note*
(With B H Lamb)
Journal of the American Medical Association *63*, 2041 (1914)

[49] *A New Bacterial Disease of Rodents Transmissible to Man*
Public Health Reports *29*, 3387 (1914)

[50] *The Mechanism of Phagocytosis*
(With G L Kite)
Journal of Infectious Diseases *16*, 109 (1915)

[51] *On the Cultivation of Entameba buccalis (A Preliminary Note)*
(With Wade W Oliver)
Lancet-Clinic *115*, 295 (1916)

[52] *On a Rapid Method of Cultivating the Gonococcus (A Preliminary Note)*
(With Wade W Oliver)
Lancet-Clinic *115*, 306 (1916)

[53] *The Rôle of Oxygen in the Cultivation of Animal Parasites (A Preliminary Note)*
(With Wade W Oliver)
Lancet-Clinic *116*, 1 (1916)

[54] *Adaptation to Certain Tensions of Oxygen as Shown by Gonococcus and Other Parasitic and Saprophytic Bacteria*
(With Wade W Oliver)
Journal of Infectious Diseases *19*, 288 (1916)

[55] *Leptothrix innominata (Miller)*
(With Wade W Oliver)
Journal of Infectious Diseases *19*, 299 (1916)

[56] *Remarks on the Filterability of Bacillus bronchisepticus*
Journal of Infectious Diseases *19*, 304 (1916)

[57] *Blood Cultures in Epilepsy*
(With Wade W Oliver)
Journal of the American Medical Association *67*, 1087 (1916)

[58] *The Educational Requirements for a Public Health Nurse of the Future*
The Visiting Nurse Association of Cincinnati. Seventh Annual Report, 7 (1916)

[59] *Further Observations on the Adaptation of Parasitic Microörganisms to a Lowered Oxygen Tension*
(With Wade W Oliver)
Journal of Infectious Diseases *20*, 28 (1917)

[60] *Influence of Oxygen Tension on Morphologic Variations in B diphtheriæ*
Journal of Infectious Diseases *21*, 47 (1917)

[61] *The Necessity of Carbon Dioxide for the Growth of B tuberculosis*
(With D M Ervin)
Journal of Infectious Diseases *22*, 194 (1918)

[62] *Cultures of a Leptothrix from a Case of Parinaud's Conjunctivitis*
(With Victor Ray)
Journal of Infectious Diseases *22*, 554 (1918)

[63] *A Respiratory Stimulant and Toxic Substance Extractable from Lung Tissue*
(With D M Ervin)
Journal of Infectious Diseases *23*, 240 (1918)

[64] *A Leprosy-Like Disease in the Lungs of a Mexican Parrot*
Journal of Infectious Diseases *27*, 293 (1920)

[65] *Inhalation Experiments on Influenza and Pneumonia, and on the Importance of Spray-Borne Bacteria in Respiratory Infections*
(With C T Butterfield)
Journal of Infectious Diseases *27*, 315 (1920)

[66] *Notes on Some Bacterial Parasites of the Human Mucous Membranes*
(With Wade W Oliver)
Journal of Infectious Diseases *28*, 341 (1921)

[67] *Action of Ammonia on Pneumococcus and Mechanism of Capsule Staining*
Journal of Infectious Diseases *34*, 124 (1924)

[68] *Gonorrheal Ophthalmia Treated with Acriflavin. Activation of Bactericidal Action of this Dye*
American Journal of Ophthalmology (Third Series) *8*, 858 (1925)

[69] *Detoxication of Bacterial Vaccines by Formaldehyde*
(With J A Bowen)
Journal of Infectious Diseases *37*, 520 (1925)

[70] *The Use of Vaccines and Dyes in Controlling Infections of the Eye*
Cincinnati Journal of Medicine *6*, 529 (1925)

[71] *A Case Illustrating Local Sensitization of the Eye to a Bacterial Protein*
(With Clarence King)
Cincinnati Journal of Medicine *8*, 85 (1927)

[72] *Tissue Hydration and its Relation to Susceptibility and Immunity, as Shown by Skin Tests in Asthma, Chronic Sinusitis and Other Infections*
Journal of Infectious Diseases *41*, 177 (1927)

[73] *The Treatment of Typhoid Fever with Detoxicated Vaccine*
(With T J LeBlanc, L Foshay and R Thomas)
Journal of Infectious Diseases *43*, 189 (1928)

[74] *Local Skin Reactions in the Selection of Antigens for Autogenous Vaccines*
(With Stanley Dorst)
Ohio State Medical Journal *24*, 539 (1928)

[75] *Phagocytes and Phagocytosis in Immunity*
Chapter LXVI in E O Jordan and I S Falk's: The Newer Knowledge of Bacteriology and Immunology, 870, Chicago (1928)

[76] *Studies in Immunity. 1 Nonspecific Factors Influencing the Reaction of the Skin to Tuberculin*
(With A Graeme Mitchell, Bernice Eddy and Frank E Stevenson)
American Journal of the Diseases of Children *36*, 720 (1928)

[77] *Note on the Cultivation of an Acid-Fast Bacillus from Leprosy*
Journal of Infectious Diseases *46*, 263 (1930)

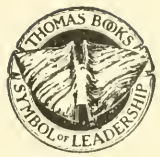
[78] *Cultivation of an Acid-Fast Bacillus from Leprosy*
Philippine Journal of Science *43*, 577 (1930)

[79] *Eczema, an Expression of Hepatic Insufficiency and its Cure with Bile Salt. An Abstract*
(With Shiro Tashiro)
Medical Bulletin, University of Cincinnati *6*, 156 (1931)

[80] *Hypersensitivity to Bacterial Proteins and its Rôle in Susceptibility and Immunity (De Lamar Lecture)*
American Journal of Hygiene *14*, 539 (1931)

[81] *The Rôle of Desensitization in Recovery from Bacterial Infection*
Annals of Internal Medicine *7*, 728 (1933)

[82] *Brucellosis in Man: Treatment with a New Antiserum*
(With A E O'Neil and Lee Foshay)
American Journal of Tropical Medicine *15*, 415 (1935)

THIS 

BOOK

WILLIAM B WHERRY
BACTERIOLOGIST
by
MARTIN FISCHER

was designed by Jaques Cattell and George M Houck; it was set and printed by The Science Press Printing Company of Lancaster, Pennsylvania, U S A, and bound by The Frank J Howard Company of Baltimore, Maryland. The type face is 14 point Garamond; the type page 28 x 48 picas; the text paper is Strathmore Wayside Text; the black ink used was supplied by the Crescent Ink and Color Company, the red by the Sinclair and Valentine Company; the quarter binding is in Morocco leather with pyroxylin cloth sides; end sheets Shadowmould Fleur-De-Lis; stamping in All Purpose XX deep Gold, 23 kt; with cover design by The Science Press Printing Company.

With Thomas Books *careful attention is given to all details of manufacturing and design. It is the Publisher's desire to present books that are satisfactory as to their physical qualities and artistic possibilities and appropriate for their particular use.* Thomas Books *will be true to those laws of quality that assure a good name and good will.*